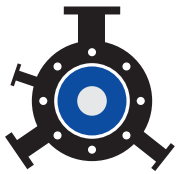


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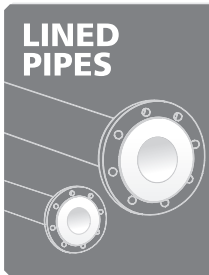
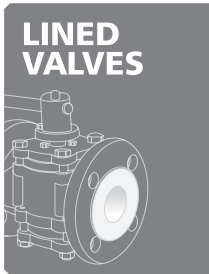
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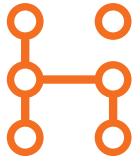


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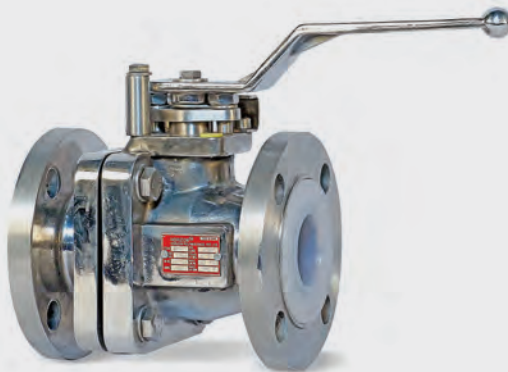
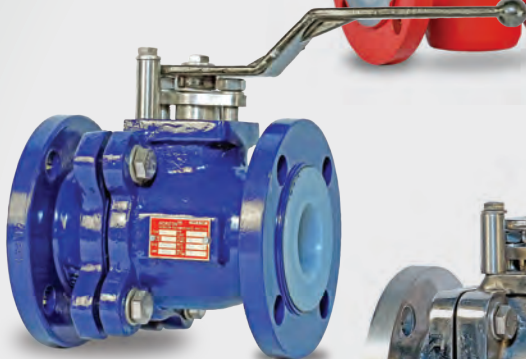
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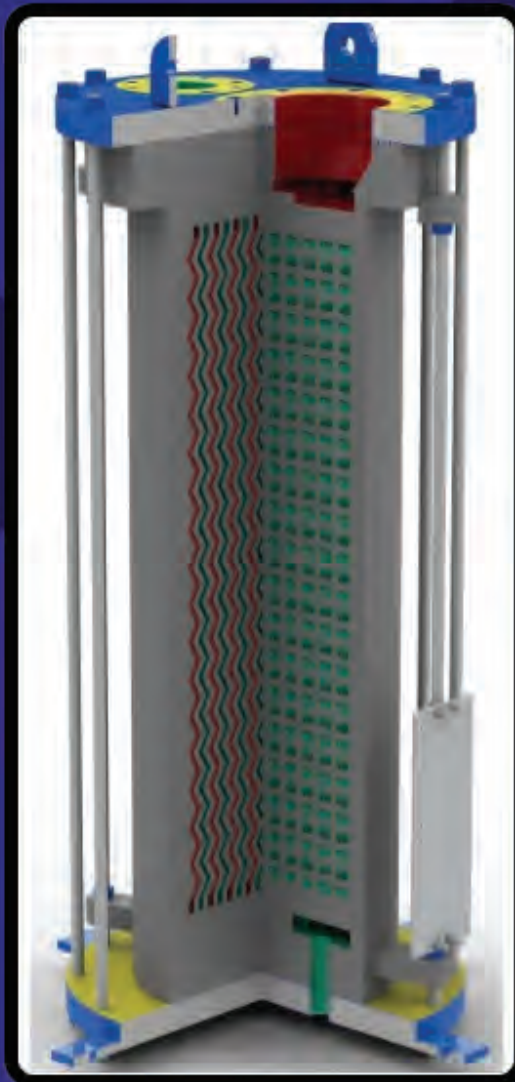
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## Govt to introduce PLI in chemical & petrochemical; planning to redraft PCPIR policy guidelines

**Mumbai, India:** Mr Bhagwanth Khuba, Minister of State, Ministry of Chemicals & Fertilizers and Ministry of New & Renewable Energy, Govt of India has said that the Department of Chemicals & Petrochemicals will soon introduce PLI in chemical & petrochemical sector and will redraft the Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) guidelines.

"The Department of Chemicals & Petrochemicals intend to bring PLI and redrafting PCPIR guidelines as India aspires to become a global manufacturing hub for chemicals & petrochemicals and we have requested the industry to share their viewpoints so that the same can be fine-tuned further," said the Minister.

"The department wants to institutionalize the process to conduct regular meetings by involving all the stakeholders to address the major issues of the industry. Enabling frameworks, providing proper infrastructure and trade related issues are among the major focus points of the Department," added Mr Khuba.

"Through PLI Schemes with an incentive outlay of Rs 1.97 lakh crore, Government of India has recently given a thrust to promote key end-use sectors such as pharmaceuticals, telecommunication & networking equipment, automobiles, electronics, mobiles, medical devices and textiles. This will further drive the demand for chemicals and petrochemicals in the country," Mr Khuba said.

According to Mr Khuba, "the tremendous growth in demand coupled with rationalization of customs duty will attract large scale investment in the sector. This additional production will support the entire chemical value chain in a big way. Starting from the raw materials to the finished goods, every single component in the value chain will see growth."

## CSIR-Indian Institute of Petroleum announces its new atmospheric-pressure hydrogen-free low-carbon desulphurization process for crude oil and refinery streams

**New Delhi, India:** Crude oil and many petroleum refining streams contain Sulphur-Containing Heterocyclic Aromatic Compounds (SCHAC), which are responsible for the corrosion of assets, poor fuel quality, health issues, and environmental problems. Refinery streams like petrol, diesel, jet fuel, kerosene and fuel oil therefore need to be treated for sulphur reduction before its final end-use. Conventionally, such treatment involves expensive, high-pressure hydrogen, high-temperature operations and significant capital investment, and also substantial associated net greenhouse emissions (carbon footprint) for effecting the necessary desulphurization.

To address this, a novel single-step hydrogen-free desulphurization process has been developed by CSIR-Indian Institute of Petroleum (CSIR-IIP). Crude oil from various sources, and sulphur-containing streams from several refineries in India, have been tested; up to 90 percent of the sulphur content, depending on the specific nature of the stream being treated, can be removed by the



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process. The transformed sulphur compounds produced from the SCHAC components by the CSIR-IIP process are easily separable from the de-sulfurized crudes or other refinery streams via simple filtration process and offer promise in bulk applications like road construction and coatings. Key patents have been filed internationally and additional filings, including Trademark protection, are in progress. CSIR-IIP invites interested industries to partner on a non-exclusive basis for collaborative research, development, scale-up and commercial deployment of the technology.

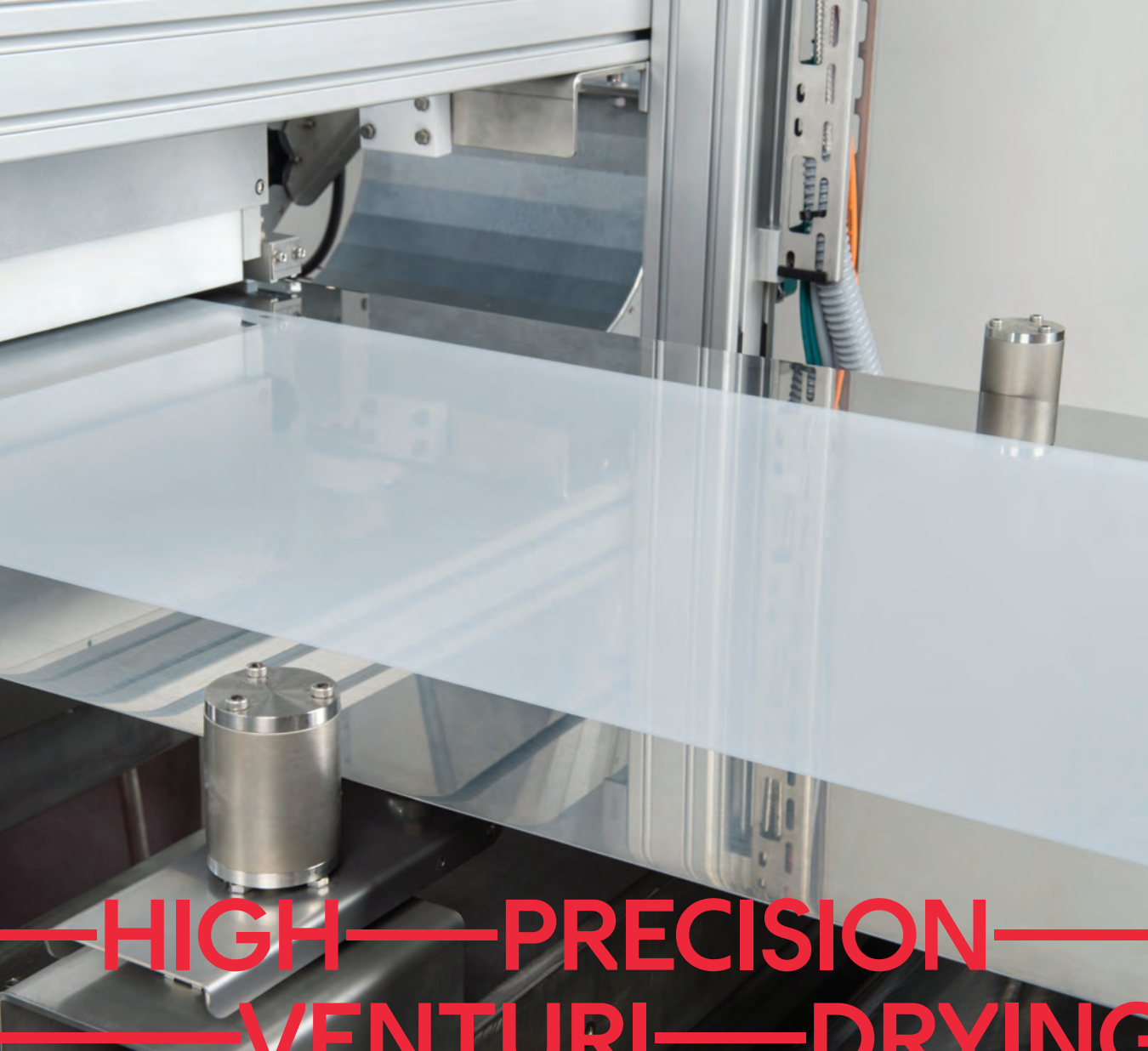
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## Dr Mansukh Mandaviya hails Memorandum of Understanding between India's Rashtriya Chemicals and Fertilizers Ltd and M/s K Plus S Middle East FZE DMCC, a subsidiary of Germany's K+S Minerals and Agriculture GmbH

**New Delhi, India:** Union Minister of Chemicals and Fertilizers, Dr Mansukh Mandaviya was today presented with an MoU signed by Rashtriya Chemicals and Fertilizers (RCF) with M/s K Plus S Middle East FZE DMCC (a subsidiary of K + S Minerals and Agriculture GmbH, Germany). The purpose of the MoU is to improve the availability of MOP for the farming community and boost the indigenous production of various grades of complex fertilizers. Shri Bhagwanth Khuba, Union Minister of State for Chemicals and Fertilizers was also present during the occasion.

As part of the MoU, M/s K plus S will supply 1,05,000 MT Muriate of Potash (MOP) per annum for the period from 2022 to 2025 at a discounted India specific price. M/s K plus S will supply MOP to M/s RCF for its captive consumption as well as for its trading purposes. This quantity will fulfil the requirement of 60% of captive consumption of RCF.





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While congratulating team RCF, Dr. Mansukh Mandaviya stated that “this Long-Term Agreement signed by RCF will go a long way in ensuring adequate supply of MOP at reasonable price to the Indian Farming community”.

## Compressed Bio Gas (CBG) is the need of the hour, and Government is taking all steps to promote ecosystem around it

**Punjab, India:** Addressing the inaugural event of Asia’s largest Compressed Bio Gas (CBG) plant in Lehragaga, Sangrur, Punjab, Union Minister of Petroleum & Natural Gas and Housing & Urban Affairs Shri Hardeep S. Puri, said that this plant in Sangrur is just the beginning of India’s master plan for a CBG-based rural economy. He said that the CBG is the need of the hour, and Government is taking all steps to promote the ecosystem around it.

The Compressed Bio Gas (CBG) plant inaugurated by Shri Hardeep S. Puri in Sangrur is a step in achieving objectives of the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme, which was launched by Government of India in October 2018 to establish an ecosystem for production of Compressed Bio Gas (CBG) from various waste/ biomass sources in the country. The scheme aims to empower and unleash the rural economy by supporting farmers, increase India’s domestic energy production and self-sufficiency and also reduce the air pollution, and help India lead the world toward a clean energy transition. Apart from this plant, 38 CBG / Biogas Plants have been commissioned under the SATAT initiative.

The CBG Plant at Sangrur, commissioned with an FDI investment of Rs. 220 crores (approx.) by Verbio AG, one of Germany’s leading Bio-energy companies, is spread across an area of 20 acres (approx.). The plant’s present production is about 6 TPD CBG, but soon this plant will process 300 Tons Per Day of paddy straw at max. capacity to produce 33 TPD of CBG using 8 digesters of 10,000 cubic meters

## The Centre of Entrepreneurship (COE) Industry 4.0 at RINL will be the hub for providing digital solutions to the Indian steel industry



**Andhra Pradesh, India:** The consortium of Rashtriya Ispat Nigam Limited (RINL), Ministry of Electronics and Information Technology (MeitY), Govt of India, Government of Andhra Pradesh, and Software Technology Parks of India (STPI) have created a Centre of Entrepreneurship-Kalpataru (COE-Kalpataru) on Industry 4.0 at RINL, Visakhapatnam Steel Plant. The partnership summit was held to share information about RINL’s entrepreneurship centre on Friday at RINL.

The chief mentor of Kalpataru, Centre of Entrepreneurship (COE) Industry 4.0 Shri





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Atul Bhatt, CMD, RINL, said that CoE at RINL will bring in several start-ups from across the country to work for the steel industry and other industries. He expressed confidence that the Kalpatru Centre of Entrepreneurship (COE) Industry 4.0 at RINL will be the hub for providing digital solutions to the Indian steel industry. Sri Atul Bhatt assured all possible assistance in nurturing the Centre of Entrepreneurship (COE) Industry 4.0 at RINL.

Speaking on the occasion, Shri Arvind Kumar, Director General, STPI, welcomed the partner industries and asked them to get associated with the COE and reap the benefits of early implementation of industry 4.0 in their organisations. He expressed confidence that the Kalpatru, Centre of Entrepreneurship (COE) Industry 4.0 at RINL, which is the 21st Centre of Entrepreneurship (COE), will provide solutions for various challenges being faced by the Indian industry. "The government's objective is to support as many start-ups as possible across the country," Shri Arvind Kumar added.

## **NTPC and Siemens Limited sign MoU for demonstrating Hydrogen co-firing in Faridabad Gas Power Plant**

**New Delhi, India:** NTPC and Siemens Ltd. signed a Memorandum of Understanding (MoU) to demonstrate the feasibility for hydrogen co-firing blended with natural gas in Siemens V94.2 gas turbines installed at NTPC Faridabad gas power plant. The total installed capacity of Faridabad gas power plant is 432 mega-watts (MW) with two V94.2 gas turbines operating in combined cycle mode. The MoU

was signed by both the companies in the presence of Shri Ujjwal Kanti Bhattacharya, Director (Projects), NTPC Ltd. and Shri Satya Prakash Chowdary N, General Manager, Siemens Ltd.

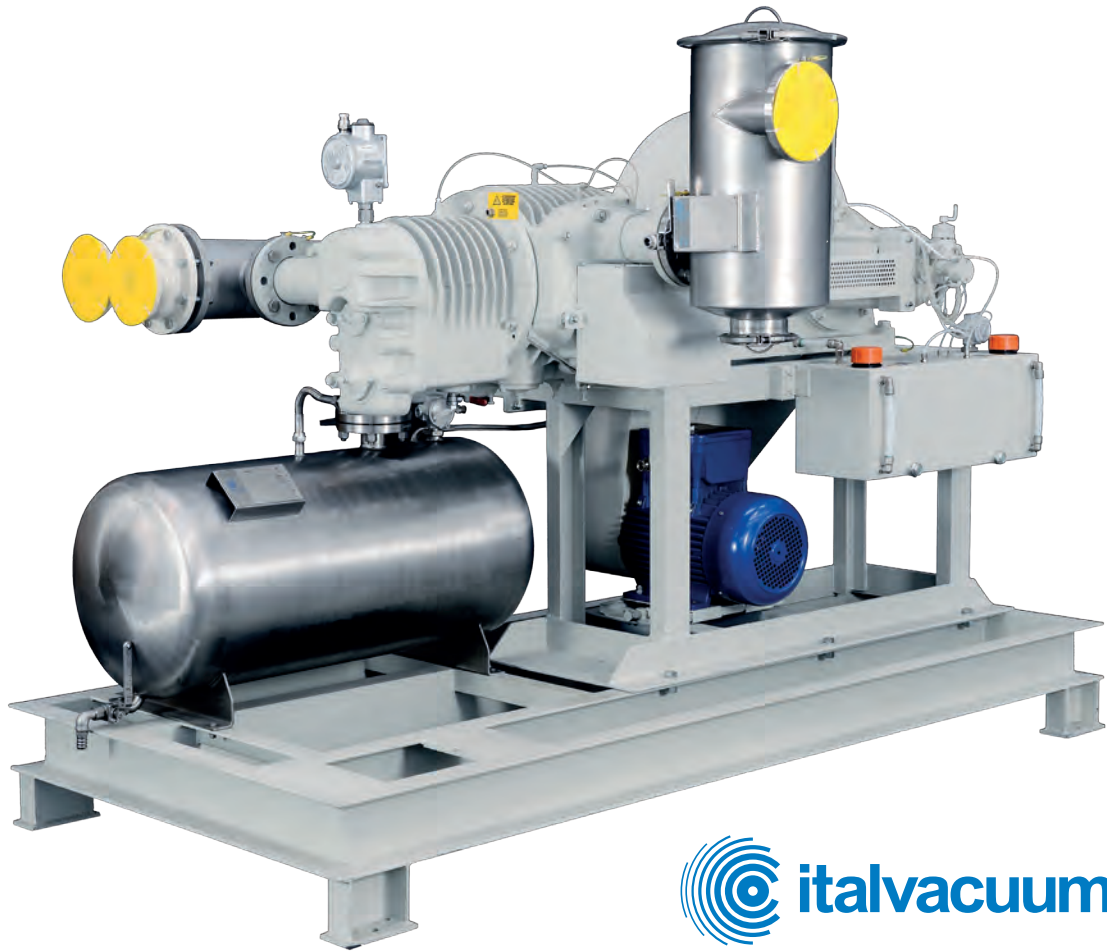
Achieving de-carbonizing targets requires a concerted and wide-ranging roadmap across all energy intensive sectors. As a part of this road map, hydrogen co-firing in gas turbines can play a key role in reducing the CO<sub>2</sub> emissions. NTPC Ltd., being the largest power generator in India, intends to play a major role in energy transition and achieving the COP26 commitments. As a part of this initiative, NTPC is exploring various new hydrogen generation technologies along with hydrogen usage so as to ensure future readiness, develop the required capabilities, technical expertise, align with the national decarbonizing and hydrogen mission targets.

Under this MoU, both the companies will collaborate to study the feasibility of introducing hydrogen co-firing in Faridabad gas power plant. Based on the feasibility studies, a pilot project for 5% (by volume) hydrogen co-firing may be implemented for demonstrating the capability and the hydrogen required for the project shall be arranged by NTPC.

## **Harnessing quantum entanglement for futuristic energy storage technology**

**New Delhi, India:** Experiments with entangled photons, and establishment of pioneering quantum information science that received the Nobel Prize in physics this

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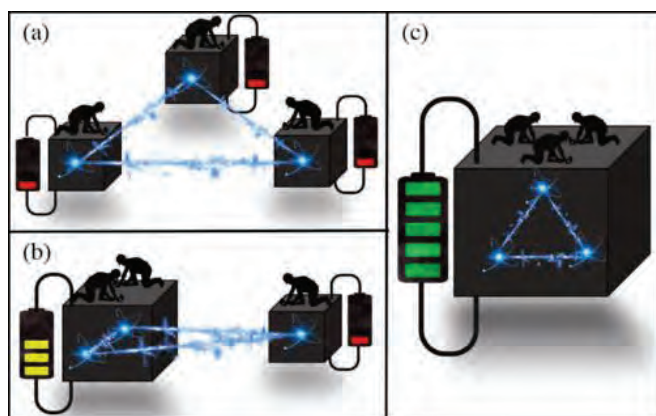
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year, also saw a new theoretical concept by Indian scientists exploring connections between the laws of thermodynamics and Quantum Information Theory (QIT). This new concept could facilitate harnessing quantum entanglement for futuristic energy storage technology.

The scientists have theorised a concept called 'ergotropy' that represents the amount of extractable work from a system by keeping its entropy (measure of randomness of a system) constant. The idea if harnessed can open pathways for putting quantum batteries to use in a way that is much efficient than its classical counterpart.

Local thermality or local passivity of such states does not always imply that the global state is thermal or passive, and hence useful form of energy can be extracted under global operations. From a composite quantum system ergotropic work, therefore, can be extracted by different means.

One can probe the individual parts locally to get useful energy which can further be stored in a battery for later uses. Probing can also be done on the whole composite system, resulting in extraction of more work. The difference between work extraction from individual parts and work extraction from the

composite system is called ergotropic gap.

Ergotropic gap can be enhanced if the parts of a composite quantum system are prepared in an entangled state. This in turn provides an experimentally efficient method to detect entanglement which has established useful resource for several protocols, such as, quantum teleportation, quantum super dense coding, and secure quantum key distribution whose implications deeply impacted physics and computer science.

## EUnited Robotics to Join Europe's Largest Industry Association VDMA

**Brussels, Frankfurt-** EUnited Robotics and VDMA Robotics + Automation merge to create one strong platform for the European robotics industry. The members of EUnited Robotics will be represented by VDMA R+A as of January 2023.

"We will combine our resources in one strong European platform to leverage the benefits of automation in Europe. This will boost our efficiency to develop standards for the smart factory of the future, address regulatory issues and promote a human centric future of work," says Wilfried Eberhardt, Chairman of EUnited Robotics.

### 13 European countries - 370+ member companies

"VDMA Robotics + Automation unites more than 370 member companies from 13 European countries," says Patrick Schwarzkopf, Managing Director of VDMA Robotics + Automation. "We look forward to continuing the full range of activities currently carried out by EUnited Robotics, such as the

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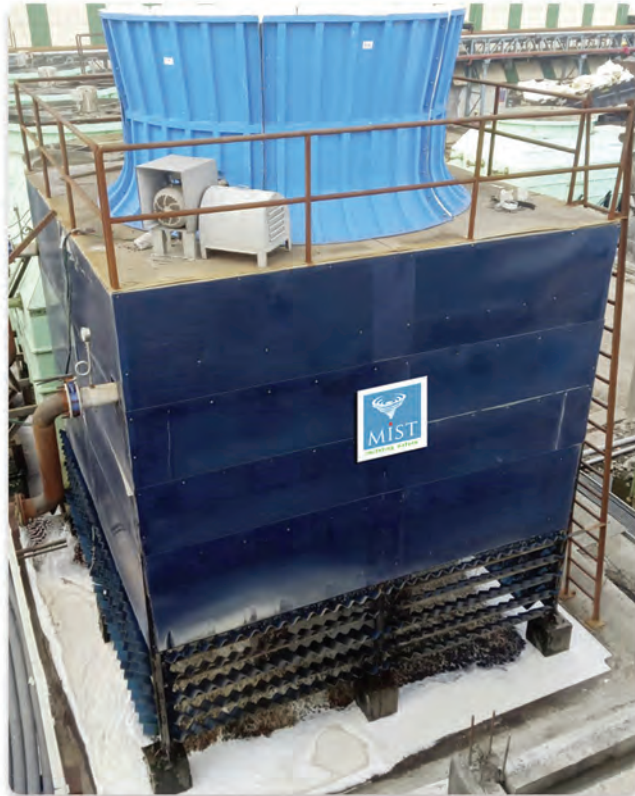
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European Robotics Summit, public advocacy, and the Good Work Charter campaign. This is truly a win-win for the European robotics industry."

### **New synergies to emerge**

Klaus-Dieter Axt, Executive Director of EUnited AISBL, adds: "The close cooperation between EUnited Robotics and VDMA R+A is already well established and reflected in the large overlap of membership in the two association platforms. With this strategic decision, EUnited Robotics' members will benefit from new synergies and enjoy the full range of services that the VDMA offers. We will continue the good spirit of cooperation between EUnited and VDMA Robotics + Automation in the future."

## 22 **Dorf Ketal to Acquire Clariant's North American Land Oil Business**

### **Muttenz, Switzerland & Mumbai, India:**

Clariant and Dorf Ketal, have announced a definitive agreement for Dorf Ketal to acquire Clariant's North American (NORAM) Land Oil business, a provider of chemical technologies and services to the North American oil and gas industry. The transaction proceedings are subject to regulatory and other customary closing conditions are to be finalized up till the first quarter of 2023.

Clariant's NORAM Land Oil business with 2021 revenues of 113 million USD, represents a growth opportunity for Dorf Ketal. The acquisition when completed will include all the assets of Clariant's NORAM Land Oil business, which includes a team of 170 employees in North America, technology

portfolio of more than 40 patent families along with manufacturing units located in Bakersfield, California; Midland, Texas; and Black Hills, Texas producing more than 2,000 formulations for drilling, production, and stimulation.

## **MoU to set up Centre of Excellence (CoE) in Green Energy**

**New Delhi, India:** PHD Chamber of Commerce and Industry is signing an MoU with Greenstat Hydrogen India Pvt Ltd to collaborate for setting up a Centre of Excellence in Green Energy (CoE-GE) on October 26th.

The objective of establishing the Centre of Excellence in Green Energy (CoE-GE) is to facilitate partnerships and act as an interface for bringing together researchers, academics, innovators, and SMEs for capacity building and create a vital link between Government of India and SME Sector for Green Energy transition of SMEs. The Centre will target six leading markets for hydrogen energy in the country that have significant economic opportunity.

## **Aramco announces 1.5 billion USD Sustainability Fund**

**Riyadh, Saudi Arabia:** Aramco today announced the creation of a 1.5 billion USD Sustainability Fund to invest in technology that can support a stable and inclusive energy transition. It was unveiled at the 6th edition of the Future Investment Initiative (FII) and is among the largest sustainability-focused venture capital funds globally.

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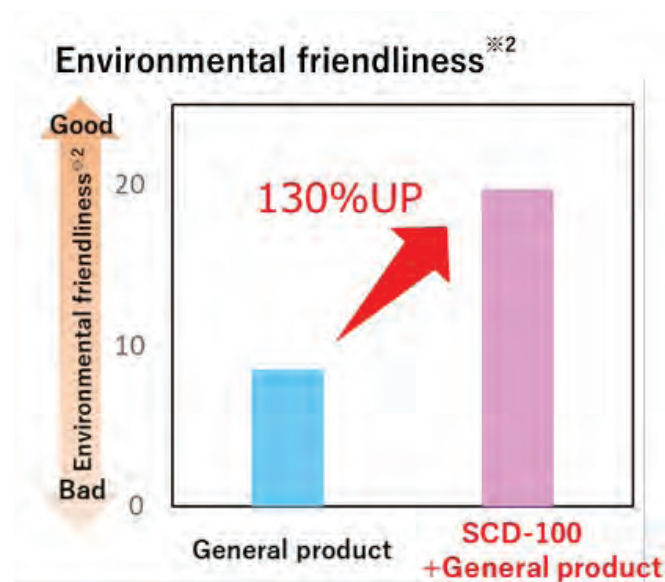


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The venture capital arm of Aramco- Aramco Venture will undertake management of the fund. Launching this fund will be an extension of the Company's efforts to meet the world's growing energy demand, with lower greenhouse gas emissions.

The fund plans to invest in technologies that will accelerate the Company's net-zero 2050 roadmap for its wholly owned operational assets, as well as development of new lower-carbon fuels. Initially the key focus areas will include carbon capture and storage (CCUS), greenhouse gas emissions, energy efficiency, nature-based climate solutions, digital sustainability, hydrogen, ammonia, and synthetic fuels. The fund will target investments globally.

## 24 Sanyo Chemical develops laundry detergent base having lesser environmental impact



**Kyoto, Japan:** Sanyo Chemical Industries, Ltd. has announced "MICELAND SCD-100," a laundry detergent base that is biodegradable, has excellent detergency, and can be

formulated in high concentrations. Such innovations would align with the growing demand for laundry detergents with reduced environmental impact, in addition to basic performance, such as washing power and liquid detergents that are easy to use and leave no residue even in water-saving washing machines have become mainstream.

Demand for compact liquid detergents has been increasing in recent years, not only because they help conserve resources in containers and reduce energy consumption for transportation, but also because their portability and ease of use are widely accepted by consumers. Factors supporting the spread of compact liquid detergents is the improving functionality of surfactants, which are the detergent bases. Until then, when detergent bases were blended in high concentrations in order to accommodate compact containers, the surfactant would cause gelation.

## Asia to lead global propylene capacity additions through 2030, forecasts GlobalData

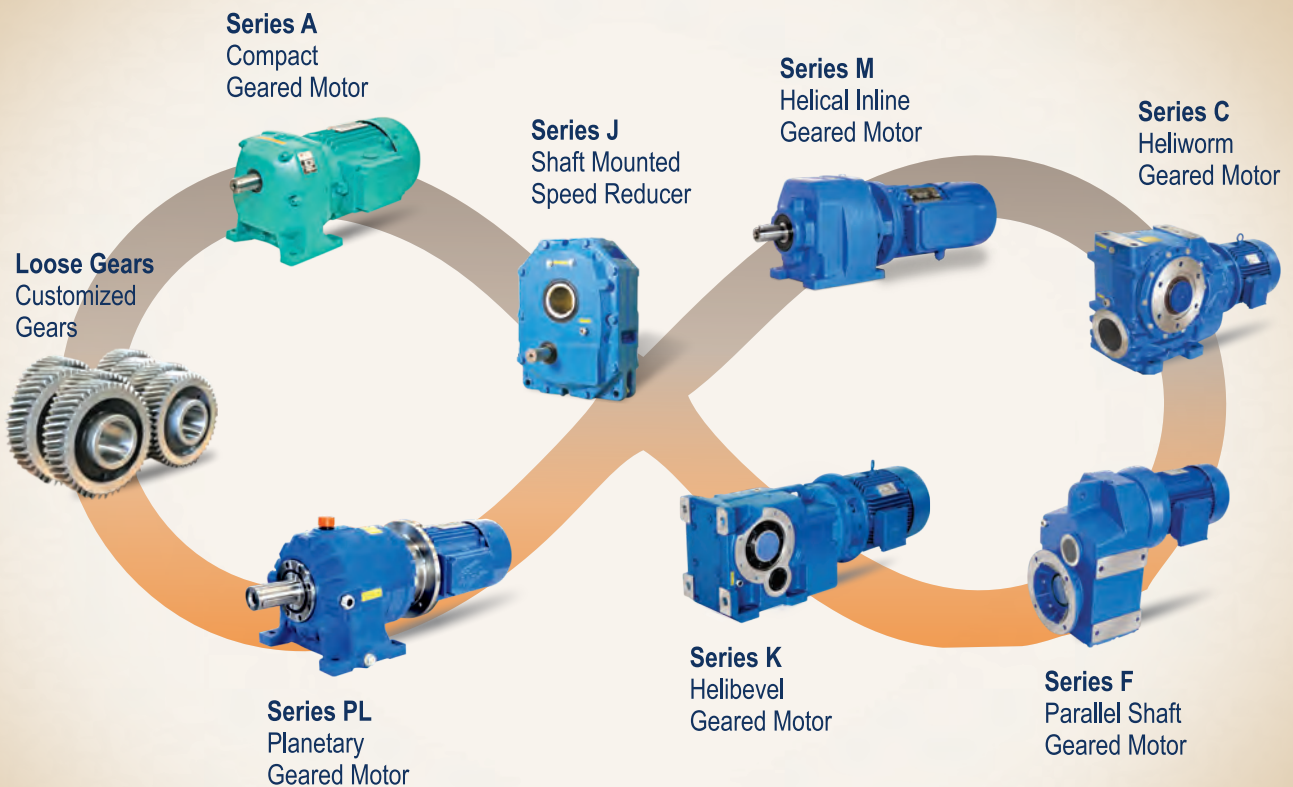
**New Delhi, India:** Asia is set to have noteworthy share of 67% in global propylene production capacity lead the global by 2030 as Asia adds capacities from new-build and expansion projects, forecasts GlobalData, a leading data analytics company.

GlobalData's report, reveals that the total propylene capacity of new-build and expansion projects in Asia will reach 42.1 MTPA in 2030. Out of this, 41.8 MTPA is expected to come from new-build projects and the remaining capacity from expansion



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projects.

“Asia will continue to lead the global propylene market with a larger number of new projects driven by key economies in the region, including China.” Says Sudarshini Ennelli, Oil and Gas Analyst at GlobalData.

The Middle East is expected to have the second highest propylene capacity additions globally. The region will account for about 8.7 MTPA of the total global new-build and expansion propylene capacity additions by 2030. Iran will be a major contributor to the capacity additions in the Middle East, by adding 4.5 MTPA capacity from new-build and expansion projects by 2030.

## Anupam Rasayan signs Two Long Term Contracts with one of the Leading European Crop Protection Company

**Surat, Gujarat:** Anupam Rasayan has signed two contracts with one of the leading European crop protection company for supplying two new life science related specialty chemicals. The company will supply these products for the next three years under the contract. These products will be manufactured in our existing manufacturing facilities.

Speaking about the contract, Anand Desai, Managing Director of Anupam Rasayan, said, “We are pleased to announce that we have signed two contracts with one of our top European customers. These contracts are in line with our strategy of increasing wallet share and deepening relationship with our existing customers. With these

additions, the tally of number of molecules with this MNC goes to 6. These products were conceptualised within 3 months and it took under 18 months from conceptualisation to commercialisation of these products. We were able to deliver these products in such short period on urgent request of our customer. This further demonstrates our customer centricity as well as strong R&D capabilities. Moreover, both of these products were being manufactured in Europe. Now the customer has decided to source these products exclusively from Anupam. We are starting to see this trend of India being chosen as preferred manufacturing base for strategical products presently being manufactured in Europe. We are working with few more MNC clients and expect 20 to 25 niche products to be added in Anupam’s product portfolio in near term as of part of Europe plus one strategy”

## EKI launches India’s first ever climate fund

**Singapore & India:** EKI Energy Services Ltd. (EKI), developer and supplier of carbon credits across the globe, today announced that it will invest up to INR 200 crores as part of an INR 1000 crores (125 million USD) climate impact fund that it has launched in partnership with Impact Capital Asset Management Pte. Ltd. (ICAM), a Singapore-based Fund Management company. Geographically, the projects will be deployed across remote locations in India and select countries in Africa, Asia and LATAM.

The INR 1000 crores (125 million USD) fund is India’s first ever climate impact fund. EKI



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will invest up to INR 200 crores in a phased manner in this fund with an aim to empower GHG Mitigation projects across the country and internationally. The Fund will specifically focus on high impact community development projects such as clean cooking through large scale deployment of energy efficient improved cook stoves (ICS), access to clean drinking water through water filtration systems and energy-saving lighting solutions like LED Bulbs and waste management amongst others, to meet its objectives of improving lives while also greening the planet.

This initiative will enhance EKI's global reach and strengthen its network of global clientele. The projects would generate high quality carbon credits for its investors by delivering significant emission reductions, which, the investors can use to offset their own carbon emissions subject to the local law or earn monetary benefits by selling the carbon credits in different carbon markets like CORSIA, domestic emission trading scheme, Article 6.2 / Article 6.4 of Paris Agreement, international voluntary markets subjected to relevant host country approvals.

## Linde and SLB collaborate on carbon capture and sequestration

**Houston, Texas:** Linde and SLB announced that they have entered into a strategic collaboration on carbon capture, utilization and sequestration (CCUS) projects to accelerate decarbonization solutions across industrial and energy sectors. The collaboration will combine decades of experience in carbon dioxide (CO<sub>2</sub>) capture and sequestration; innovative technology

portfolios; project development and execution expertise; and engineering, procurement and construction (EPC) capabilities. "Carbon capture and storage will be a key lever for tackling global warming," said Sanjiv Lamba, Chief Executive Officer, Linde. This collaboration will focus on hydrogen and ammonia production, where CO<sub>2</sub> is a by-product, and in natural gas processing CCUS abates the emissions from these energy-intensive industries, creating new low-carbon energy sources and products. " ■



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**CLEAN ENERGY**

- Hydrogen
- Biofuels
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- Renewables - Solar Wind & Hydro

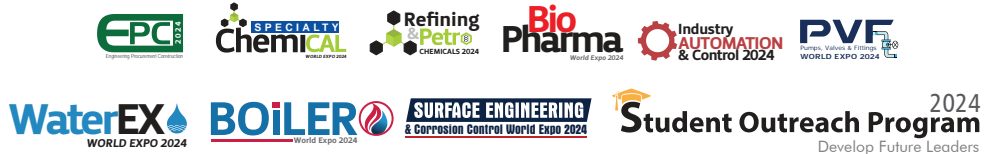
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## Barauni Plant of HURL commences Urea production

**Barauni, India:** Barauni Plant of Hindustan Urvarak & Rasayan Limited (HURL) commences urea production. The country has achieved another milestone by setting up new ammonia urea plant at Barauni which has started urea production yesterday. The state-of-the-art gas based Barauni Plant is part of the initiative taken by the Government to revive the closed urea units of Fertilizer Corporation of India Ltd. (FCIL) and Hindustan Fertilizers Corporation Ltd (HFCL) in order to achieve self sufficiency in urea sector. Revival of closed units of FCIL and HFCL had been the top priority agenda of the present Government to augment the availability of domestically produced urea. Government mandated Hindustan Urvarak & Rasayan Limited (HURL) to revive Barauni unit with an estimated investment of Rs. 8,387 crores with urea production capacity of 12.7 LMTPA.



Kumar Saxena were present on the occasion. In his address, the Union Home Minister said today is a big opportunity for this region and the National Capital for taking steps to fulfill the pledge taken by Prime Minister Narendra Modi to make the Capital garbage free through cleanliness. He said after the commissioning of this plant, Delhi has a capacity to dispose off about 7,000 metric tonnes of garbage per day. Shri Shah said 2,000 metric tonnes of waste will be segregated, burnt and used in a Green way every day from this plant starting today. Along with this, about 25 MW of Green Energy will also be produced.

## The Union Home and Cooperation Minister, Shri Amit Shah inaugurated the Tehkhand Waste to Energy Plant

**New Delhi, India:** The Union Home and Cooperation Minister, Shri Amit Shah, inaugurated the Tehkhand Waste to Energy Plant, which will generate electricity from the waste of Municipal Corporation of Delhi, in New Delhi today. Several dignitaries including the Lieutenant Governor of Delhi, Shri Vinay

## PM addresses on the occasion of expansion of ArcelorMittal Nippon Steel India Hazira plant

**Hazira, India:** The Prime Minister, Shri Narendra Modi today addressed the gathering on the occasion of expansion of ArcelorMittal Nippon Steel India (AM/NS India) Hazira plant. The Prime Minister said that through the steel plant, not only

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- Biofuels
- Methanol
- Nuclear

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- Corrosion Control Technologies & Services

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- Heat Exchangers, Cooling Towers & Boilers
- Storage Tanks
- Compressors, Pumps & Valves
- Plant instrumentation & automation
- IT Infrastructure & Digital Technologies

**Facts & Figures**  
 2020

**EXHIBITORS**  
 151

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**SPEAKERS**  
 89

**DELEGATES**  
 714

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investment is taking place but doors of many new possibilities are also opening. "An investment of more than 60 thousand crores will create many employment opportunities for the youth of Gujarat and the country. After this expansion, the crude steel production capacity at Hazira Steel Plant will increase from 9 million tonnes to 15 million tonnes", the Prime Minister informed. Underlining the growing role of the steel industry in goals of moving towards a developed India by 2047, the Prime Minister said that a strong steel sector leads to a robust infrastructure sector. Similarly, the steel sector has a massive contribution in roads, railways, airport, ports, construction, automotive, capital goods, and engineering products.

### **CRI's world's largest CO<sub>2</sub>-to-Methanol starts production in Anyang**

**Henan Province, China:** The world's first commercial scale CO<sub>2</sub>-to-methanol plant has started production in Anyang, Henan Province, China. The cutting-edge facility is the first of its type in the world to produce methanol — a valuable fuel and chemical feedstock — at this scale from captured waste carbon dioxide and hydrogen gases. The plant's production process is based on the Emissions-to-Liquids (ETL) technology developed by Carbon Recycling International (CRI) and first demonstrated in Iceland. The new

facility can capture 160,000 tonnes of carbon dioxide emissions a year, which is equivalent to taking more than 60,000 cars off the road. The captured carbon dioxide is then reacted with the recovered hydrogen in CRI's proprietary ETL reactor system with the capacity to produce 110,000 tonnes of methanol per year

### **Nagarnar Steel Plant, Commissions Coke Oven Battery No.1**



**Chhattisgarh, India:** NMDC's Nagarnar Steel Plant at Bastar district in Chhattisgarh state, inched closer to its commissioning on Friday the 28th October 2022, when Shri Somnath Nandi, Director Technical, NMDC commissioned Coke Battery No.1. Shri K Praveen Kumar, ED In charge, Nagarnar Steel Plant and other senior officials were present on the occasion. The first batch of coke was discharged on Friday afternoon paving the way for sequential commissioning of subsequent key units. Being a greenfield integrated steel plant, several major units need to be commissioned sequentially



so that their interdependence can be established smoothly in Nagarnar Steel Plant. Battery No. 2 is due for commissioning in next few days and the process will eventually culminate in the commissioning of the Hot Strip Mill and Thin Slab Caster in the coming months.

## Cabinet approves development of Container Terminal at Tuna-Tekra

**Tuna-Tekra, India:** The Cabinet Committee on Economic Affairs chaired by Hon'ble Prime Minister Shri Narendra Modi has approved development of Container Terminal at Tuna-Tekra, Deendayal Port on Build, Operate & Transfer (BOT) basis under Public-Private-Partnership (PPP) mode. The estimated cost of Rs 4,243.64 crore will be on the part of the Concessionaire and an estimated cost of common user facilities of Rs 296.20 Crore will be on the part of the Concessions Authority toward development of common user facilities. On commissioning of the Project, it shall cater to the future growth in Container Cargo traffic. From 2025, a net gap of 1.88 million TEUs shall be available which can be catered by Tuna Tekra Development of a state-of-the-art container terminal at Tuna-Tekra will give it a strategic advantage as it will be the closed container terminal serving the vast hinterland of northern part of India.

## Indian Fertiliser companies sign MOU with Canpotex, Canada one of the largest Potash suppliers globally



**New Delhi, India:** In a significant step towards ensuring long-term fertiliser availability for the farming community, India's fertiliser companies- Coromandel International, Chambal Fertilizers and Indian Potash Limited signed an MoU with Canpotex, Canada on 27th September 2022. Canpotex, Canada is amongst the largest suppliers of Potash globally, exporting around 130 LMT of product annually.

Union Minister Chemicals & Fertilizers hailed the signing of long-term agreements between the companies for supply of MOP (Muriate of Potash) to the Indian farmers. Calling this a path-breaking step, Dr Mansukh Mandaviya stated that "The MOU will reduce both supply and price volatility and ensure stable long-term supply of Potassic fertiliser to India. Government of India has

been encouraging the domestic fertiliser industry for establishing supply linkages through long term partnerships with resource rich nations. Given India's high dependence on imports of raw material and fertiliser minerals, these partnerships provide secured availability of fertilizers and raw materials over a period and also offer price stability in volatile market conditions."

### **Coal India signs MoUs with BHEL, IOCL and GAIL to set up 4 mega coal-to-chemical projects**

**New Delhi, India:** For setting up four large scale coal-to-chemical projects through surface coal gasification route, Coal India Limited (CIL) has signed three Memorandum of Understanding (MoU) with three major PSUs of the country - Bharat Heavy Electricals Limited (BHEL), Indian Oil Corporation Limited (IOCL) and GAIL (India) Limited. To come up at an aggregated estimated cost of Rs. 35,000 crore, the proposed surface coal gasification (SCG) projects are planned to be set up in West Bengal, Odisha, Chhattisgarh, Maharashtra, and Tamil Nadu. Through the SCG route coal is converted into Syngas. This can be subsequently processed for downstream production of value-added chemicals which are otherwise produced through imported natural gas or crude oil at enormous cost. As the country's four major PSUs huddle together, the move is aimed at reduced forex outgo, promoting

self-reliance and capitalization of indigenous resources. Another upside will be employment generation with direct employment of around 1,200 personnel and indirect employment to the tune of over 20,000 persons.

### **PM Modi dedicates four plants of GACL to the nation**

**Bharuch, India:** Prime Minister Narendra Modi dedicated four plants of Gujarat Alkalies and Chemicals Limited (GACL) to the nation at a function organized by Gujarat Industrial Development Corporation (GIDC) at Amod, Bharuch.

The plant commissioned are: 105,000 TPA Chloromethanes Project at Dahej; 10,000 TPA Hydrazine Hydrate Project at Dahej; 173,250 TPA Caustic Soda Expansion at Dahej; and 267,000 TPA New Caustic Soda Plant with 130 MW Thermal Power Plant at Dahej, put up as a joint venture between GACL and NALCO.

### **Air Water constructs new liquefied gas plant in Chennai**

**Chennai, India:** Air Water India Private Limited, wholly owned subsidiary of Air Water, has decided to construct a new plant to produce liquefied gasses, namely, liquefied oxygen, liquefied nitrogen and liquefied argon, in Chennai, Tamil Nadu. The plant will have a production capacity of liquefied oxygen: 5,100N m<sup>3</sup>/h, liquefied nitrogen 1,600N m<sup>3</sup>/h, liquefied argon: 200N m<sup>3</sup>/h. Construction will start in

October 2023 and operation is scheduled to take place in October 2024. The Indian government established the goal of increasing its crude steel production capacity to 300 million tons by 2030.

## **Meghmani Finechem commissions additional capacity of 106,000 TPA of caustic soda**

**Gujarat, India:** Meghmani Finechem Limited, a leading integrated chemical manufacturer in India, yesterday announced the commissioning of an additional 106,000 TPA capacity of caustic soda with a captive power plant of 36 MW. After the expansion, MFL will have 400,000 TPA of caustic soda capacity with a captive power plant of 132 MW. The plant has been commissioned on time and within the estimated CAPEX. An increase in the capacity of caustic soda is in line with the setting up of new derivatives and specialty chemicals, i.e., epichlorohydrin (commissioned on 1st June 2022), CPVC Resin (commissioned on 18th July 2022), and other future products. This additional capacity of caustic soda will provide raw material for Epichlorohydrin, CPVC Resin, Chlorotoluene & its value chain and other future projects leading to strengthening MFL's fully integrated complex.

## **SI Group expands production capacity of aminic antioxidant**

**Rasal, India:** SI Group, a leading performance additives company,

announced it will add manufacturing capabilities and capacity to begin producing Ethanox 757 aminic antioxidant at its Rasal, India facility. Ethanox 4757 is an octylated-butylated diphenylamine primary antioxidant used in lubricants, greases, industrial, automotive and heat transfer fluids. Commercial materials are anticipated to be available in Q4 2022 and will add several thousand tons of availability of this critical chemistry. Ethanox 4757 aminic antioxidant is designed to extend the life of lubricants and is a crucial part of additive packages.

## **RIL to restructure group EPC resources for O2C and New Energy**

**Mumbai, India:** The Board of Reliance Industries Limited (RIL) has approved a scheme of arrangement under which the EPC and Infrastructure Undertaking of Reliance Projects and Property Management Services Limited (RPPMSL), a wholly-owned subsidiary of RIL is proposed to be demerged into RIL. This demerger, together with the existing EPC team in RIL, creates a focused EPC undertaking in RIL to cater to the needs of the group. Current EPC resources of RIL group are spread across different operating entities. The focused EPC Undertaking will aggregate and synergize engineering capabilities and expertise of the group. The EPC undertaking will play a pivotal role in implementing RIL's large projects across O2C, New Energy and 5G roll-out.

# Catalyzing Green Growth of Indian Specialty Chemicals Industry



36

It is more than clear now that reaching the Net Zero by 2050 or 2070 depending upon what commitment we have made and that's limiting the rise of global temperature to 1.5 C implies profound economical and societal shifts. Specialty Chemicals industry has been an enabler and supplier to many other industries whether it is auto, cement or pharmaceutical or electronics we have to recognize that our customers have also made commitments for net zero. Industry leaders emphasize upon the stronger interactions between the manufacturers, specialty chemical manufacturers and academia to drive green growth of specialty chemicals suppliers for sustainable industrial growth.

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## Dr Raman Ramachandran

M.D.P. Chairperson and Professor of Practice, K.J. Somaiya Institute, Somaiya Vidyavihar

**T**he McKinsey's Global institute has identified six key characteristics as they are the anatomy of this huge transition that is underway. The first and foremost of them is, this transition will have to be and will be universal. In other words there is no industry or no country that can be insulated or that will be spared from the impact of the transition that is going to happen. We in the chemical industry who have relied on transforming carbon compounds from fossil sources with solvents and catalysts and making products for many enabling industries were in some ways part of the problem. But now we really need to act to develop and provide solutions that is in our power. So, as an industry which has been an enabler and supplier to

many other industries whether it is auto, cement or pharmaceutical or electronics we have to recognize that our customers have also made commitments for net zero and some of them as aggressive as 2030 which is just about 8 years away. If we do not recognize and act, I am afraid that there is a good chance that some of us will become redundant and some will be left behind. At the same time, it is also heartening to note that there are technologies already available which will enable us in this transition and some of our industry colleagues are actively innovating and adopting them. However, such tectonic shifts and transitions cannot be achieved without forward looking policies which enable, incentivize and support. ■

# “Consumer companies across the world are realizing that it is not their own manufacturing footprint that matters but it is the consumer footprint”



**Mr. Sudhir Sitapati**

CEO, Godrej Consumer Products Ltd.

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**F**or most of my career whenever we spoke to partners in the Specialty Chemical industry, we were all interested into superior efficacy, affordability and reduced costs. This is really the paradigm in which we all have continued operating for many years. I think there has been a pretty significant change in terms of a third dimension of sustainability which has come in over last decade or so which is not very new. I think, certainly many companies have been focusing on sustainability in terms of manufacturing processes and factories for the last 10-15 years. Godrej

for example, is one of the companies that takes sustainability very seriously and Godrej Consumer Products Ltd (GCPL) was ranked number 6 in the Sustainability Index of Business World this year. Over that last decade we started drawing 30% of our energy needs from renewables, cut emissions by half since 2010, recharge water twice and send Zero waste to landfills.

However bigger the company the amount of difference that it can make in its own operations to the environment is relatively small. Consumer companies across the world are realizing that it is not their own

manufacturing footprint that matters but it is the consumer footprint. For example Godrej Consumer across the world reaches about a billion consumers a year which is the number of consumers who use our products thus making life more sustainable. The products they use is really the name of the game by which the industry along with our chemical suppliers can really transform the sustainability. I want to share two examples, one of which is to do with the specialty chemicals.

Malaria is a much bigger killer than COVID. As the 2nd largest company in the country in household insecticides, we improved sustainability of our product Goodknight Gold Flash, electric vaporizer mosquito repellent which is far better for environment than the coils. And for the mosquito coils, we also came up with innovation to substitute the plastic wick imported from Germany. These wicks were expensive and difficult to dispose. We closely worked with our suppliers and found the solution to replace the imported plastic wick with indigenously sourced biodegradable jute wick that was available at one fourth of cost of plastic wick. The idea came to us from Aerorama Products who is the supplier of Airwick's and other chemical products based in Pondicherry. We sell 20 crore of these products a year which made a huge difference in terms of both in terms of economics and sustainability for us.

Second idea has much to do with the specialty chemicals industry where we collaborated with our group company to bring down the cost of hand washing. Typically, cost of liquid in plastic, water & transportation account for more than 50% of cost of handwash. We launched Magic Hand wash, a small sachet with powder which can be put in a bottle shaped kit and used. This was a complicated task because the product had to be hydroscopic to absorb the water but not so hydroscopic to avoid becoming mushy in the supply chain. The challenge was to have right viscosity so that it was easy to handle by consumers who generally in India do not follow instructions and most of them go with estimation. We worked together our sister concern Godrej Chemicals, also a supplier to develop this product and in two years' time. By volume, this product is now number two in the Indian market in the hand wash space as well saving tons of plastic, water and transportation. ■

# “Challenge to achieve Green Growth is Multi-dimensional, Multi-technology”



**Dr. Dietmar Hueglin**

CEO., Godrej Consumer Products Ltd.

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**T**o catalyze green growth of industry is an unprecedented challenge especially for chemicals which makes it more exciting for the researchers. In my career of last 32 years with the industry, though academically CO<sub>2</sub> issue was known, for the research chemists product performance and to match eco-toxin criteria mattered the most. The research was aligned with the vision of industry that allowed them to develop complex chemistries. Now, there is a total change of paradigm and the challenge to achieve ‘Green Growth’ is multidimensional and multi-technology.

The first pivot is reaching Net Zero which will require electrification of processes with green energy. This would require an approach to go from coal to green which

is a huge challenge. This will compel us to accelerate the efforts to realise the vision of becoming hydrogen economy to produce green hydrogen as a chemical reactant and a raw material to mitigate CO<sub>2</sub> emissions using new technologies. Even if we achieve the target to reduce emissions, we will have to achieve the second pivot of Circular Economy as we cannot continue to manufacture products and then dump them in environment or incinerate. But we have to have processes of chemical recycling in place to use the carbon back in the value chain to transform ourselves from linear to circular economy. The third and the most important pivot is to shift from conventional fossil fuel based feedstock to natural, bio based, renewable feedstocks which will lead to green manufacturing. At BASF, we have the Greentech Accelerator



Products that form roughly 20% of our sales presently which we would like to get to 100% but we still have challenge in some of the products where we do not have any alternatives.

Earlier Covid & now Russia – Ukraine war have created market disruptions and inflations. But irrespective of this organizations have to look at being profitable and Government must be a strong catalyst for industrial growth.

Regarding my assessment of India, when I came here in 1980 for the first time, it was a different country altogether. In the last 30 years the country has made significant

progress that is visible in academia with emergence of IITs and CSIRs which was not the case back during my early years here. In my opinion, India has one big issue that the private research is more privately funded and there is a need to have better connect between industry and academia. Reducing the industry academia gap can be an enabler for building strong Innovation Engine to tackle the issues and catalyze green growth for specialty chemicals in India. I am very optimistic but this will require immense efforts from the Industry, the Academia and the Government. ■

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## “Do right things in terms of using right chemical processes to have efficient processes and cost reduction”



**Dr. Habil Khorakiwala**  
Chairman, Wockhardt Group

42 India's environmental ranking by some American Company, they put Denmark as number one, U.K. at number 2 and they put India at last 180 and then with little deeper analysis I realized this was not per capita it was done as a country of 1.3 billion, obviously we cannot compete with Denmark on that. We all must move in our own way to environment friendly. I believe in the next 25 to 30 years India shall make a significant progress as we have the advantage of not making so much pollution per capita and can adopt various ways of life in a manner where we can control the environment pollution in a more significant way on per capita basis. But when you have large growth it does affect pollution on overall basis and this is something we have to manage.

Many decades ago, Mahatma Gandhi said, "Earth provides enough to satisfy every

man's need but not every man's greed", I think this is very telling that more we consume the more we waste and create more pollution. We have seen in many fields, especially in our industry that when you do right things in terms of using right chemical processes, obviously you end up using lesser chemicals, have more efficient processes and cost reduction. So normally when you want to be environmental friendly and to be green growth it is not expensive it is in fact free and many times it reduces your cost. There are many books written stating both on environment and quality is always free if you do the right thing. Someone has rightly said "Never innovate to compete, one must innovate to change the rules of game". I think this is a great opportunity all of us have to think differently organization to provide this kind of the green growth which is possible. ■

# “Right ecosystem and Government interventions will propel the industry in the right direction”



**Mr. Vinod Gupta**

CEO, Punjab Chemicals and Crop Protection Ltd.



Our Prime Minister has signed up for India to achieve carbon neutrality by 2070. Across the globe, there is a sudden aggression in industries and countries to move towards carbon neutrality and controlling the temperature. US President Joe Biden has set targets for White House as well as for the Government machinery. A bipartisan infrastructure plan has been published which actually focuses on some core industries to reduce carbon footprint and also create some trade barrier in case the targets are not met. So, may be at some stage those who achieve targets will have advantage above those who do not. In

China's recently published 14th Five Year Plan, the country has set very aggressive targets to reduce carbon footprint, reduce water and energy consumption and talking about reaching turnover of USD 1.57 trillion for Green Industry.

India is also highly ambitious and there is lot of international interest coming into the market. We need to look at technology, innovation, Green Chemistries and policies supporting R&D. Lot of work needs to be done as far as environmental regulations and setting framework for tracking are concerned. . I think we need to have right ecosystem and right Government interventions to propel the industry in the right direction. ■

## “Research & Innovation is the key to achieve demand & carbon targets”



**Mr. Rajendra Gogri**  
CMD, Aarti Industries Ltd.

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I always say that our chemical industry is in a sweet spot. The Indian chemicals demand is expected to grow up to 50 billion USD plus exports, which is a huge opportunity for import substitution as well as exports for the manufacturers. More so for the specialty chemicals and intermediates which have seen increase in demand in the last decade after the Chinese currency started appreciating against Indian currency. Environmental disruption in China and the US China trade war made it very clear that global supply chains had to move to China plus One, and for chemical industry, India was a natural choice.

Ten to fifteen years back, many products disappeared from India's manufacturing scene as these producers could not compete with the low-priced Chinese imports for pharma and agrochemicals. To manufacture the products in India for import substitution or exports, if the Government can introduce product specific schemes for stabilization of technologies for the first 3 to 5 years will encourage the industry. Another recommendation for the Government is to incorporate ESG as corporate social responsibility where the industry can put 50% of the CSR fund in chemical innovations. Simultaneously, the industry associations can identify the products for

import substitution and exports depending on the macro trends and recommend projects for research by academia. Right now, there is a lack of collaboration between industry and academia. Chinese industry is a big success story as the university research is available to many companies rather than being restricted to few. Some of the new technologies may be highly capital intensive and considering incentives for implementation or providing subsidies can go a long way to accelerate the demand of new innovations.

Our government has already attracted lot of investment to produce semiconductors which is a good opportunity for specialty chemical manufacturers to produce chemicals for electronics industry. Some of the other sectors that will drive the demand of these chemicals in the near foreseeable future are batteries for energy storage for EVs and wind turbines. Consumer facing as well as other industries who are now trying to focus on reducing the Scope 3 emissions that will require collaborating with the vendors and suppliers. Carbon neutrality is a reality and each country, and each industry has to have strategy linked under this overarching goal. More than half of India's population is young, and I think they are convinced about the perils of climate change. The investors, shareholders, companies and now even politicians are talking about climate change. To achieve

carbon neutrality will require lot of new chemicals.

Chemical manufacturers will have to switch to carbon neutral feedstocks and having said that, this obviously requires lot of research. Second, the processes may have to be modified to make greener to reduce waste and produce waste by-products that can be further utilized in other processes. Unlike many other industries, there are no off the shelf technologies or play & plug models available for the chemical sector and to realize the emerging potential, chemical manufacturers need to develop customized solutions through extensive research work. The income tax incentive for research & development of extra percentage expired in 2020. To achieve the on neutrality goals set by the Government requires rethinking on giving tax breaks for research & development which is on a general scale. Unless industry and the government work together to up the ante for research and innovation, we'll miss the bus. ■

## Open Innovation Strategy: Industry Academia Collaboration

*With ever increasing costs of research activities, failure to commercialize an innovation becomes a major setback for the company. Many companies are opting for 'open innovation' strategy using externally generated innovations along with the internal research. The author discusses how pharma companies in US and Europe have been working closely with academic institutions for a long time that has resulted in commercialization of many active ingredients, complex formulations as well as excipients.*

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Pharmaceutical companies have a conservative approach in terms of their research activities and innovations.

Thorough research is carried out within the company for which they engage state of the art research facilities and manpower. There is a great deal of secrecy involved in the research, data generated and the product innovations. Secrecy guarantees data confidentiality and avoids unnecessary competition.

However, not all innovations can be commercialized, which means that solitary research can become quite a costly affair. Similar research activities ongoing in different companies increase competition

and decrease the chances of product commercialization. With ever increasing costs of research activities, failure to commercialize an innovation becomes a major setback for the company. This has led to a paradigm shift in the conservative approach of companies and many are opting for 'open innovation' strategy.

Open innovation refers to using externally generated innovations along with the internal research. The open model of research has been adopted by many industries such as IT, computers as well as healthcare. This is evident from the fact that there is a steep increase in joint literature published in the form of journal articles and patents in recent years. A

survey has found that open innovations in medical and pharmaceutical research began to appear in the literature in mid-2000s and most of the research was done in North America and Europe, with Asia lagging behind [1]. One of the important sources of external innovations are academic institutions.

### Need for Academic Partner

Academic institutions impart knowledge and thinking abilities in students. Academia majorly deals with basic research that is more exploratory in nature. It may be difficult to generalize this statement as this would totally be subjective. However, more emphasis is given to the proof of concept and prototype development. This helps industries to focus more promising research strategies as well as generate data for diversification in future. Academia, with its basic research and industry

undertaking development activities, work in a complementary manner to provide good scope for innovations.

### Industry Academia Collaboration (IAC): Global scenario

The pharmaceutical companies in US and Europe have been working closely with academic institutions for a long time. These collaborations have resulted in commercialization of many active ingredients, complex formulations as well as excipients. A recent survey suggests that academic inventors or founders have contributed to more than a quarter of all medicines approved from 2001 through 2019[2]. Few top collaborations in recent years include universities such as University of Basel, Switzerland, (Collaborator: Novartis) University of Oxford, University of Manchester, UK, (Collaborator: Astrazeneca plc) University of Copenhagen, Denmark, (Collaborator: Novo Nordisk) Harvard University, US, (Collaborator: Pfizer Inc.) University of Cambridge, UK, (Collaborator: Glaxo Smithkline plc).

#### Few Global Top Industry Academia Collaborations

- University of Basel (Switzerland) & Novartis
- University of Oxford, University of Manchester, (UK) & Astrazeneca Plc.
- University of Copenhagen (Denmark) & Novo Nordisk
- Harvard University (US) & Pfizer Inc.
- University of Cambridge (UK) & Glaxo Smithkline Plc.

### IAC: Indian Scenario

India has seen a tremendous increase in academic research in the past decade. In fact, India has ranked 3rd in the world in terms of number of publications, as per the NSF database, US[3]. Additionally, our country has also recorded the highest

number of PhDs. This data is encouraging as it would mean that India has highly qualified researchers involved in research activities. Despite these facts, the industry academia collaboration in India has not enjoyed the success that has been observed in the western countries. There are two major reasons for this observation,

- **Industry focus:** Indian pharmaceutical industry has focused predominantly on development of generic products. Very few companies are actually involved in drug discovery process that may need basic research inputs from academia. This is primarily due to the high cost and low success rates involved in introducing new molecule in clinic. Majority of the research work in such companies is confined to developmental activities only. This may limit the involvement of academic institutions as product development is relatively easy and does not require innovative inputs from academia. Development of complex generic products on the other hand is a challenging job that requires expertise as well as elaborate research. Most IACs in India are involved in development of such products. In the recent years, the number of companies engaged in developing complex and biopharmaceutical products is also increasing and so is the scope of IACs.
- **State of academic institutions:** The academic institutions have

severe resource crunch. Except for government funded institutions such as NIPERs (National Institute for Pharmaceutical Education & Research) and few other top ranking institutions, most of private institutions lack the infrastructure necessary for undertaking industrial research. Additionally, the students as well as faculties of many institutions fall short in meeting expectations of industrial collaborators in terms of keeping themselves updated with technological advances. One of the major reason for this observation is the lack of industry academia interaction. It has also been noticed that although India has a high publication rate, the ratio of research to commercial products is very poor. Similar is the situation with the Intellectual Property (IP) coming out of this research, indicating lack of resources and/or narrow focus of research. There is a need to have a radical change in conventional teaching learning process in order to cultivate research attitude and out of the box thinking abilities in students that is required for innovation.

To improve this situation, the Pharmacy Council of India (PCI) has taken efforts in framing a uniform syllabus for bachelors as well as master's programs which includes research projects at the bachelor's level. The National Education Policy (NEP)-2020 has placed priority on research in higher



educational institutions. To boost research environment in higher education, the NEP has devised the following roadmaps to

- a. Develop research capabilities among the faculty members and to facilitate the development of research culture in the state universities and other public institutions
- b. Seed, grow and fund research at academic institutions with the establishment of National Research Foundation (NRF).

## Government initiatives

Considering the global rate of success in IACs the Indian government has taken valuable measures which can help in building a strong partnership between industries and academia. It has implemented various industry academia support programs that have been instrumental in bringing industry and academia together. Some of the key

government departments that fund such programs are mentioned in Table 1.

The Government of India has also incentivized the industry for undertaking collaborative research with academia. These incentives include financial assistance under Industry academia joint projects, and tax benefits.

## Benefits of IAC

With IAC, companies gain skilled workforce with expertise which can be utilized for accelerating innovations. Additionally, the efforts and finances can be minimized by outsourcing the basic research activities which have narrow scope of actual commercial success. On the other hand, such partnering can definitely provide source of funding for academic institutions which can be helpful in building the infrastructure.

Sr. No.	Funding Agency/Ministry Department	Programs & Schemes
1	Department of Science & Technology (DST)	Indian Innovation Growth Program (IIGP)
2	Department of Scientific & Industrial Research (DSIR)	Patent Acquisition and Collaborative Research & Technology Development (PACE)
3	Science & Engineering Research Board (SERB)	Prime Minister's Fellowship Scheme for Doctoral Research
4	Department of Biotechnology (DBT)	Contract Research Scheme
5	University Grants Commission (UGC)	University-Industry Inter Linkage (UIL)

Table 1: Government agencies and schemes for funding IAC

## Conclusion

Collaboration is the key to have a win-win situation for industry as well as academia. The direct involvement of academia in research and innovation is a highly potent collaborative approach for gaining new ideas, enriching knowledge and broadening the ongoing activities in industry. Consequently, the academia is also benefited in terms of funding that help them to develop their infrastructure. The open innovation model has worked out beautifully in the western countries. We hope that the same may prove useful in India and help the Indian Pharmaceutical Industry in scaling greater heights.

## References

- *Open Innovation in Medical and Pharmaceutical Research: A Literature Landscape Analysis. Frontiers in Pharmacology. 2021, 11, Article 587526.*
- *Rising Academic Contributions to Drug Development: Evidence of Vigor or Trauma? ACS Pharmacology & Translational Science. 2020, 3, 1427–1429.*
- *https://nces.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field. Accessed on November, 2022. ■*

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## Enzymes- Bridging the gap for Climate Neutral Future



### Mr. Krishna Mohan Puvvada

Regional President, India & Business Director  
Consumer Biosolutions, Novozymes India

*Krishna Mohan Puvvada, Regional President - India, Novozymes articulates the meticulous process of producing the industrial enzymes which would enable a wide array of industries and their end users to reduce carbon emissions and accelerate their sustainability efforts. With rising demands for healthier vegetable oils, Novozymes Enzymes can enable sustainable interesterification in Oil & Fats industry which would align them towards consumer demands. Implementation of digital technologies & their center stage in developing Bio-solutions such as Novozymes enzymes is articulated. With understanding the needs of consumers, end-user industries, the development pipeline of Novozymes and their expansion plans in Indian process industry is highlighted.*

### **Could you provide our readers an overview of Enzyme technology developed by Novozymes?**

At Novozymes, we produce industrial enzymes using a process called submerged fermentation. This involves growing selected microorganisms (bacteria and fungi) carefully in closed vessels containing a rich broth of nutrients (the fermentation medium) and a high concentration of oxygen (aerobic conditions). As the microorganisms break down the nutrients, they produce the desired enzymes. Most often the enzymes are secreted into the fermentation medium. It goes for a downstream process of purification, concentration, and stringent quality check before being released to the market.

Enzymes produced at Novozymes are used in a wide array of industrial or household processes. We connect with the consumer while they are doing their laundry or cleaning dishes, using textiles, consuming food grains, poultry, bread, juice, beer or while driving a vehicle using ethanol blended fuel. From an industrial perspective, we are enabling a biobased world leading to a paradigm shift towards biodegradable, reduced chemical usage in B2B industrial processing, and higher levels of agricultural yield to handle growing consumption.

### **How would Novozymes Enzymatic Catalysts unlock opportunities for Specialty Chemicals Industry?**

We see a lot of potential in bio-catalysis. With the evolution of enzymes and the need to make chemical process more sustainable, we see increased interest in the use of biocatalytic processes to produce high-value and chiral precursor chemicals. Similarly, we see huge opportunities in enzymatic interesterification with the rising demand for healthier, heart-friendly vegetable oils free of trans fats. Novozymes offers safe, environment friendly solutions that has let food manufacturers meet the demand for healthier oils. Another powerful opportunity is emerging with the focus on 2G ethanol which is a critical building block for biochemicals.

Novozymes' enzymes have the potential to unlock opportunities in varied fields such as delivering the same efficacy of washing products reducing the use of chemicals because enzymes are highly weight efficient performing ingredients. New fields are emerging in the sustainable alternatives like bioethanol, bio-based polymers etc. which has immense potential.

### **What all digital technologies are leveraged by Novozymes to expedite small & big molecule development & introducing it into market?**

Data is the new oil and data management is the key to innovation. Novozymes utilizes its expertise in genomic sequencing and bioinformatics to maintain an inhouse extensive data base on microbial/ fungal gene and protein sequences. We also have our own protein crystal structure database. These constantly updating data bases combined with inhouse bioinformatics tools, gives Novozymes the unique edge in selecting the correct biotechnological solution for various industrial application. Protein engineering research today is not limited by the generation of data, but by the ability to interpret the data for data collation, analysis, and interpretation. The research team at Novozymes utilizes technologies like big data, cloud storage, molecular dynamics (MD) simulations, deep learning (ML) and artificial intelligence (AI). Novozymes has a thriving data community of data analysts who are constantly upgrading our ability to quickly interpret large volumes of data.

We operate across multiple industries and customized digital tools. We have developed a range of digital tools that allow customers to calculate the impact

of our biosolutions through the lens of sustainability and performance.

### **What role the solutions developed by Novozymes would play in accelerating Chemical Industry's journey towards Carbon Neutrality?**

Slowing the rate of climate change and lowering environmental impacts through responsible consumption are the key global sustainability goals that are helping to drive innovation. Biotechnology – enzymes and microbes - can enable this and help industries accelerate their journey towards carbon neutrality, including the chemical industry.

In the context of chemical industry, one of the critical areas is water and waste

**Biotechnology-enabled biorefineries are a here-and-now solution, saving millions of tons of CO<sub>2</sub> by turning waste and plants into a range of end-products, including low-carbon fuels. It has already replaced fossil fuels used in transportation, energy, and manufacturing sector. By plugging into the power of plants, we can help bridge the gap to a climate-neutral future.**

management. Our bioaugmentation solutions for COD removal contain a blend of microbes who can target a broad range of organic compounds. They supplement the biological activity of a plant's existing microbial community to increase COD removal efficiency in a plant. With our solutions, a plant can reduce COD concentrations in effluent, as well as reducing effluent variation. The result is improved plant stability, despite fluctuations in wastewater streams.

Broadly, as part of our strategy, Novozymes has made a commitment to "Accelerate towards a climate-neutral society". Our BioSolutions enable industries to reduce carbon emissions from factories, transportation, improve the environmental footprint of the food we eat, reduce the amount of chemicals used in agriculture, and save energy and water from the detergents we use. Biotechnology-enabled biorefineries are a here-and-now solution, saving millions of tons of CO<sub>2</sub> by turning waste and plants into a range of end-products, including low-carbon fuels. It has already replaced fossil fuels used in transportation, energy, and manufacturing sector. By plugging into the power of plants, we can help bridge the gap to a climate-neutral future. In fact, according to International Energy Agency analysis, we can't reach net zero

by 2050 without biorefineries. Novozymes' latest foray into carbon-capture is the next generation technologies for converting CO<sub>2</sub> into valuable products. Today, a major portion of our revenue comes from products that contribute to reduction in CO<sub>2</sub> emissions. Many of these products also helped solve problems with food systems, such as increasing yields in agriculture, improving animal feed and decreasing food waste.

### **New products that are currently in development pipeline at Novozymes that would cater to the Indian Chemical Industry.**

Novozymes is focused on bringing sustainable and environmental solutions in the following broad segments - Agriculture, Human and animal health, Biopharma and Diagnostics, Biorefinery and sustainable plastics. We are currently developing advanced biological solutions for improving plant health and crop quality, improving animal gut health, and niche chemicals for accurate diagnosis of diseases. Novozymes has just commercialized its technology for 2G ethanol which can help India achieve its ambition of 2G ethanol for petrol blending. We are closely working with oil manufacturing companies to make this a reality. Novozymes is working across the

globe with partners in promising fields of carbon capture and bioplastics both of which have immense potential for Indian companies.

### **Expansion plans, challenges in regard to cost-effectiveness, scalability in the Indian Corridor.**

Emerging markets is a focus area for Novozymes, and India is one of the key countries as it presents multiple opportunities. India is fast evolving to enhance manufacturing on the lines of the Atmanirbhar initiative, this coupled with rising consumerism and quality seeking consumers, the opportunity is high for solving unique challenges of our country. Looking through the value chain and offering technology and bringing in innovation is a way to address the price sensitivity and drive cost effectiveness.

India is also leading the path towards decarbonization efforts, and this opens newer opportunities. We have a manufacturing base in India and as green opportunities emerge, we are committed to invest and expand into India. ■

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# Denatonium benzoate: Rodent Repellent Master Batch

*Denatonium benzoate (DB), which is also used commercially under several brand names is reported to be the world's bitterest compound. Its application as a denaturant in industrial alcohol is long known, however in recent times it is also been used in household products & toys for prevention of accidental ingestion by children. Owing to its bitter taste it is also reportedly used as a rodent repellent and is available commercially in the form of sprays or in combination with other repellent products. The use of denatonium benzoate in the form of Denatonium Benzoate- Rodent Repellent Master Batch (DB-RRMB) for incorporation in polymeric material is the scope of discussion in this article.*

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Denatonium benzoate was first discovered by W. Barnes in the year 1958, when working for T & H Smith in Scotland.

It occurs as a colorless & odorless solid with a melting point in the range of 166-170°C. It was first patented under the brand name BitterX.

The bitter taste causes a nuisance, when working with solid denatonium benzoate, since extremely small amounts induce a strong bitter taste.

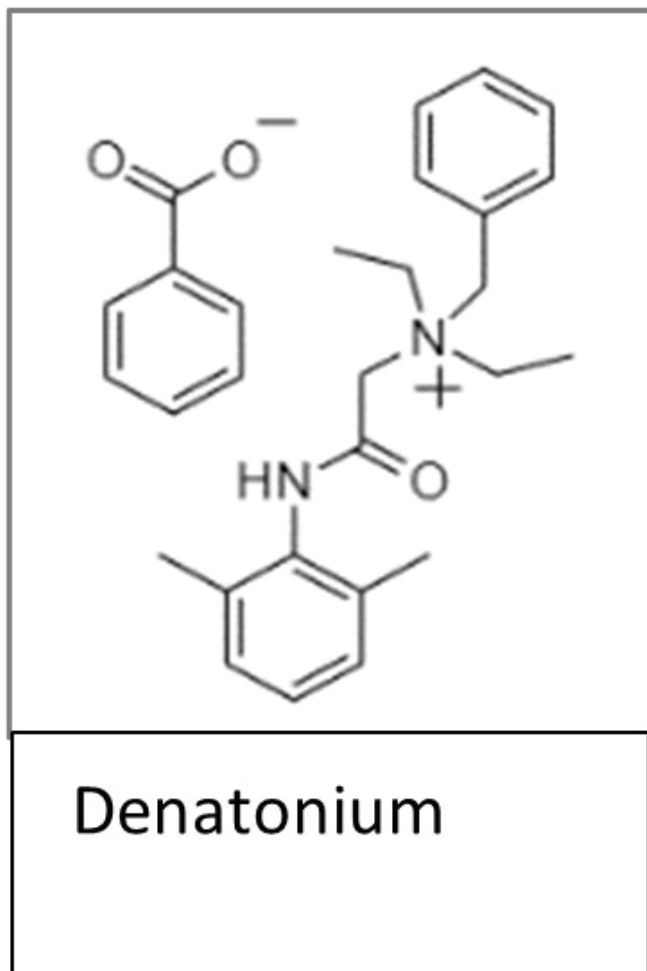
## Use of Denatonium Benzoate as a repellent

Rodents are reported to cause structural

### Applications of Denatonium Benzoate

- Agrochemicals
- Animal repellent
- Denaturing Alcohol
- Oil & Lubricants
- Personal Care
- Pharmaceuticals





damage to homes, offices and virtually any type of building not only by means of gnawing but also by nest building & contamination by means of defecation. They also pose damage to electrical wires & connections.

Several instances have been reported wherein wires damaged by rodents has caused short circuits & fires. Chief Engineer of Power Development Department, Mr. Hasmat Qazi said "Rodents are a real threat to the system. This, at times leads to a short circuit and a blast at the station".

Denatonium benzoate is made use of as a repellent due to its characteristic bitter taste. Since handling DB powder is a tedious task in-itself, it has been formulated into a master batch with various polymer bases to service varying applications. These master batches can then be further incorporated into end products to obtain rodent repellency.

### Mode of Action

Denatonium benzoate, being the active compound, the mode of action is via the bitter taste that is perceived when the rodent attempts to bite the DB-RRMB incorporated material. Denatonium Benzoate is known to be the world's most bitter compound and its extreme bitter taste is perceivable to taste buds at very low concentrations as well. Thus, when the rodent attempts to damage the wires containing DB-RRMB, the bitter taste deters them from chewing the wires & cables. Denatonium benzoate is known to have a threshold of 0.05 ppm, thus even at lower concentrations it is known to exhibit a bitter taste. It also has a bitter index of 1000 thus stating that it is 1000 times bitter than quinine.

### Denatonium Benzoate – Rodent Repellent Master Batch

The denatonium benzoate master batch is available under different base polymers such as EVA and LLDPE. These would

PROPERETIES	UNIT	TYPICAL VALUE
Base Polymer		Ethyl Vinyl Acetate (EVA); Low Density polyethylene (LLDPE)
Recommended Dosage	%	1.5 % TO 2%
Moisture	%	0.10 max
Appearance		Cylindrical Pellets
Bulk Density	gm/cc	0.060 ± 0.005
Colour		Off- White to light yellow
Odour		Odourless
Solubility Stability	N/A	Insoluble in water & solvents

- Ease of handling is the primary advantage that the master batch provides.
- Denatonium benzoate being non-toxic, non-hazardous, and environmentally friendly is a safe choice from toxicological aspect
- The master batch is easily dispersible in the final products due to its high surface area, thus causing no alterations in

then be of compatibility with several other grades of polymers such as PVS, HDPE, XLPE, EPDM, PP, ABS etc. Denatonium benzoate is incorporated into the base polymer and passed through an extruder, in varying concentrations basis the end use applications & the stability of the final product. The master batch has high stability towards thermal exposure of about 200oC, thus making processing safer and easier. The master batch poses a clear advantage against using denatonium benzoate directly, by discarding the direct exposure to denatonium benzoate for the end user.

its properties

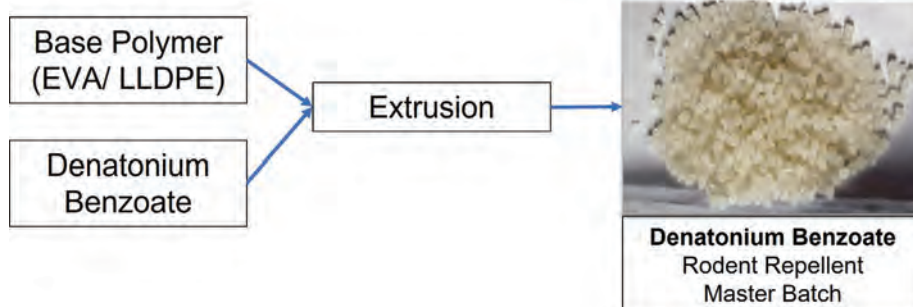
- It offers additional protection against termites in addition to rodents
- Does not kill the rodent, but repels them thus avoiding menace due to dead mice
- The master batch is also odourless thus making the work environment safer

## Applications of DB-RRMB

The DB-RRMB batch finds application in

## Making Rodent Repellent Master Batch- Denatonium Benzoate

Highlights of DB-RRMB



various industries where rodents cause high menace. The wire and cable industry being the most important segment as disruptions in these are associated with huge potential losses. Other areas of application include tubes & piping systems, wiring harnesses, outer covering for food packaging, trash bags etc.

Different applications use varying levels of DB-RRMB in their final products. For the wire and cable industry a dosage of 1.5% of DB-RRMB is known to give rodent repellence. However other applications where in the thickness of the end product is less, may require the use of higher concentration of DB-RRMB in the range of 3-5%.

### Product Efficiency Tests

Optical fibre cables incorporated with 1.5% DB-RRMB (test sample) were tested for its rodent repellence. The repellence testing is performed using two different methods i.e., choice method & no-choice method, for the rodent species Rattus under laboratory conditions.

The test results for the experiments are mentioned in the table below:

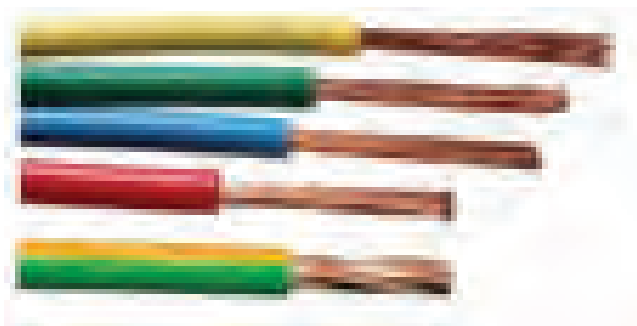
Rating Scale: 0-10; where 0 is best & 10 is worst

### Effectiveness of products on different types of wires

The DB-RRMB is effective for several range of products such as non-metallic sheathed cables, single conductor wires, communication cables & multimode optic fibre cables to display excellent rodent repellence.



Non-metallic sheathed cables



Single conductor wires

**Rating Scale: 0-10; where 0 is best & 10 is worst**

		Number of days				
		3	5	7	10	14
% DB-RRMB	1.5	0	0	0	0	1
	2	0	0	0	0	1
	4	0	0	0	0	1

\*Analysis performed at NABL Accredited Laboratory.

## FEATURES



Communication cable (Co-axial cable)

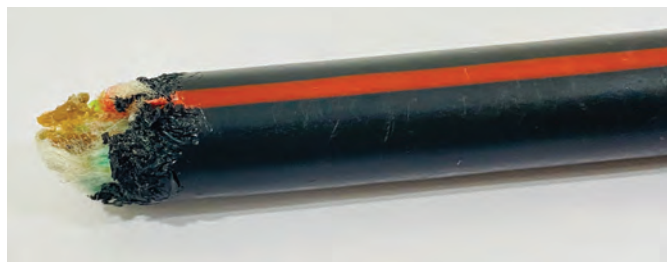


Multi-mode optic fibre cable

use of DB-RRMB is a sustainable and non-toxic option for manufacturers, end users & rodents. ■

## Photographs of samples subjected to Rodent repellence evaluation

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Untreated samples photos



Samples treated with DB-RRMB

## Conclusions

The results of these tests clearly demonstrate a superior rodent repellency performance of the wire samples incorporated with DB-RRMB. Thus, the



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# CCUS: Enabling technology pathway to achieve climate goals



**Mr. Mark Courtney**

Global Market Director CCUS, Howden

*Mark Courtney explores enabling technological pathways that can successfully reduced emissions across their user industries, accelerating our efforts to decelerate global warming & carbon emissions. He also articulates how hard-to-abate sectors can reduce their net emissions through CCUS and with Net Zero, Sustainability, Climate change at the backdrop what the policies from the governments and international organizations can do to catalyze our efforts towards cessation of Climate change.*

## What is the scope for carbon capture technology in emissions mitigation?

Carbon (CO<sub>2</sub>) capture technologies are not new, they have existed for decades; but in recent years they have been identified as a key tool in the CO<sub>2</sub> reduction needed to maintain global warming well below 1.5°C. CCUS is a fundamental part of all clean energy scenarios and according to the International Energy Agency (IEA), could account for up to 20% of emissions reductions required across industry sectors.

A world leader in air and gas handling technologies, Howden is accelerating the energy transition efforts of its customers across the energy sector. Howden has been a leading supplier within these markets for over 160 years, and our broad application and product knowledge position us well to drive new CCUS processes, including direct air capture (DAC). Howden products, including fans, heaters, compressors, rotary heat exchangers and steam turbines, are used in carbon capture processes across a variety of hard-to-abate industries, such as power generation; petro-chemical, oil, and gas (PCOG); steel; and cement. Howden has been involved in numerous CCUS demonstration projects around the world and is currently engaged in hundreds of FEED studies and proposals for new, active projects.

The success of carbon capture technology

**While the lack of a stable global carbon market means that demand is not increasing rapidly enough, modeling demonstrates that the world cannot meet its target of limiting global warming to 1.5C without Carbon Capture.**

also relies upon the global markets, governments and technology companies recognizing the unequivocal role of deploying carbon capture technologies, and reaching large scale, to achieve our climate targets.

## Globally, how is the market demand of CCUS technologies growing and which markets will drive the demand of this clean tech?

The demand is strongest from hard-to-abate industries like PCOG, coal-fired power, steel, and cement. Hard-to-abate sectors are generally defined as those industries with processes that need energy vectors in excess of 400°C to operate. While the lack of a stable global carbon market means that demand is not increasing rapidly enough, modeling demonstrates that the world cannot meet its target of limiting global warming to 1.5°C without carbon capture.

The speed and scale of growth required in carbon capture to limit global warming to

1.5oC is exponential and unlike anything we have seen in the industrialized world. The IEA suggests that carbon capture needs to increase to 7.6 billion tonnes per year by 2050, which is around 50 times the current levels of 150 million tonnes per year in 2022.

Therefore, the adoption of carbon capture and an increase in the number of projects commissioned globally will be a vital step in the world's climate change mission. In the USA, recently passed legislation, like the Inflation Reduction Act that has dedicated 369 billion USD to address climate change over the next 10 years, provide access to capital, improving the economics to actually develop and deploy CCUS projects. Similar legislation is developing in Canada, the UK, Europe, and Australia.

### **What are the pros & cons of Utilisation vs Storage of CO<sub>2</sub> (in the short & long term) and what do you typically recommend to the customers?**

Utilization should always be considered, particularly in the context of a circular economy. Howden has significant experience in CO<sub>2</sub> compression with over 300 installations globally, utilizing our full product range including reciprocating, centrifugal, diaphragm and screw compressors. However, utilisation alone is estimated to provide only 10% of the CO<sub>2</sub> requirements to achieve meaningful climate change. Therefore, 90% of the

captured carbon is destined to permanent storage (sequestration) and must be the key focus when developing CCUS projects, technologies, infrastructure and products.

The CCUS value chain involves capture, as well as transportation and storage. However, transportation and storage both present their own challenges notably with regards to permitting and acceptability linked to pipeline construction and location. Howden is uniquely positioned, with our experience and existing product range, to offer solutions throughout the CCUS value chain, in both transportation and permanent storage.

### **Tell us about the available opportunities in the near foreseeable future globally & in APAC region.**

Half of the world's current CCUS demand exists in the US, while one quarter comes from Europe and the remaining quarter from the rest of the world. This regional segmentation exists for several reasons, with the first being that the US is the largest emitter. Secondly, the US and Canada are located near areas that are well-suited to sequestration, with access to vast tracks of land and to offshore storage locations, such as the Gulf of Mexico. Lastly, the most economical financial incentives now exist in those markets.

With the recent Inflation Reduction Act legislation in the USA, and the tax incentives that accompany it, many

businesses are now channelling investment into carbon capture projects due to their financial viability and environmental impact.

Additionally, our APAC region is reaping the benefit of large-scale CCUS projects, both existing and planned. Australia has accelerated permitting for five key areas across their continent, while China is focusing its CCUS deployment on energy, petro-chemical, cement and steel. Japan is planning its CCUS strategy around maritime and large gas fields, and notably, Indonesia is leading the APAC region with more than twelve named projects under consideration for deployment over the next 5 years.

From 2030, CCUS is projected to be deployed on a significant scale in other parts of Asia, notably India, and the Middle East, where India is home to some of the largest and the youngest assets for coal-fired power plants as well as cement, iron and steel, and chemical plants.

**Walk us through Howden's presence in India, experience, and some of the key projects.**

Earlier this year, Howden opened a new office in Noida, Delhi, India following more than 40 years of operation in the country. The new office opened in addition to factories in Chennai and Hosur, an aftermarket team in Pune, and a joint venture with India's leading infrastructure

company Larsen & Toubro in Faridabad, and it came in response to the growth in demand for air and gas handling equipment within India's fast-growing economy.

The move further positioned Howden within our own market, offering access to products for India's high quality supply chain and facilitating access to expertise and technology across the global business. Howden's leadership position in compression solutions for hydrogen also means we are ready to support India's investment in their energy transition, including CCUS, similar to our role in their Air Quality Control System (AQCS) upgrades within India's coal fired power sector.

**Please share insights into the future plans of Howden in India & globally.**

CCUS is an important emerging market on the path to net zero and is going to play an increasingly vital role in the energy transition. For example, direct air capture is expected to lead to 20% of the carbon capture required to meet climate goals. My recent appointment as Global Market Director of CCUS, along with our core CCUS team, demonstrates our commitment to investing in this space early to ensure we can provide customers with the technology, products and services that they need to effectively deploy CCUS.

Howden has leveraged its expertise and



existing products and solutions to support its customers' energy transition goals. We have made significant investments and advancements in our hydrogen capabilities over recent years, playing a key role in innovative and large-scale projects around the world including HYBRIT, the world's first fossil free steel plant. Carbon capture is an equally exciting emerging technology and Howden is currently working on three of the largest carbon capture projects in the world, taking place across the US in Texas, Wyoming, and Indiana. We are providing our long-standing, proven technologies, and our innovations, including fans, compressors and rotary gas-gas heat exchangers, along with our decades of experience in the energy sector, to support these vital projects. I am confident that our expertise will keep Howden at the forefront of our global energy transition as we support CCUS and our new and existing customers. ■

# CHEMICAL ENGINEERING WORLD

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to  
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# Application of Single-Use Technologies (SUT) in Biosimilar Development

**T**he current processing paradigm of large manufacturing facilities dedicated to single-product production is no longer an effective approach for best manufacturing practices. Additionally, in recent years, patents on several blockbuster biologics have expired, which means leading pharmaceutical companies can no longer charge a premium for these products.

The subsequent launch of biosimilar drugs, which can be sold at a lower cost, has put pressure on manufacturers to lower production spending in order to stay competitive.

Single-use systems are ideal for multi-product manufacturing facilities, especially where process steps may differ. They eliminate contamination crossover, change out time, and downtime for cleaning and sterilization between batches and products. Therapeutic developers are increasing their use of single-use systems for

clinical batches, and many will continue at production scale as batch sizes become smaller.

## Benefits of Single Use System

- **Primary savings** benefit of single-use systems for biosimilar development is the reduced cost for process development and clinical trials. By changing out pre sterilized single-use bags between product batches, manufacturers can eliminate the risk of inter-batch contamination from more difficult to manage in-house sterilization processes. Single-use systems also have applications in formulating and filling operations,



## Single-Use System Pro's & Con's

Technical	Traditional Stainless-Steel Technology	Single Use Technology
Product Change over Time	Slower	Faster
Flexibility to change	Painful	Easy
Campaign Turnaround times	Slower	Faster
Water Usage/Wastewater	High	Low
Solid waste Disposal	Less	More
Leachable/Extractable validation	Small	High
Facility Size	Large	Smaller
CIP	Complex	Simpler
SIP	Complex	Simpler
Sustainability	Low	High

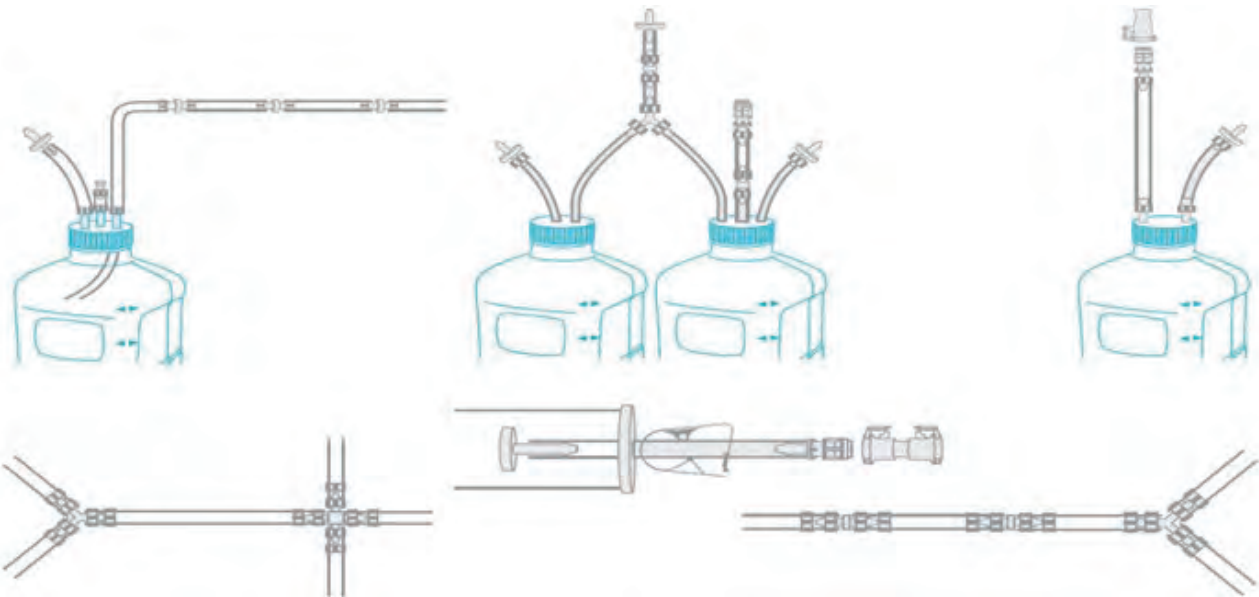
moving purified biosimilar drug substances to the formation container.

- **Single-use technologies offer savings in cleaning expense,** especially purified water and WFI usage and have demonstrated greater safety without endangering environmental efforts compared to stainless-steel systems. By implementing single-use systems, manufacturers can avoid issues related to cross contamination between batches and products. Cross contamination is a risk with all bioprocessing equipment that is reused, including piping, tanks, mixers, and bioreactors. Cleaning validation for such equipment is expensive and time-consuming.

- **Single-use systems reduce costs associated with maintenance,** and assembly, minimize operator exposure, and free facility resources for other activities. Eliminating user-managed cleaning and sterilization reduces the need for a utility system and piping within a facility, leading to faster facility build time and lower capital cost. Establishing a single-use-enhanced facility takes about half to a quarter of the time that it takes to install a stainless-steel facility.

### A solution toward Single Use Assemblies

A wide range of gamma irradiated single use assemblies could be developed



for various critical applications in biopharmaceuticals. These range from simple tubing with connector to complex manifold with several joint/connection. All the assemblies are manufactured and packed in Class 7 certified clean room. These assemblies cover the whole upstream and downstream bioprocess, ranging from laboratory scale and pilot plant scale to production scale. Few applications of upstream and downstream production in Biopharmaceutical industries where Ami polymer supplying assemblies listed below:

- Buffer and media transfer- feeds, the addition of base/acid, antifoam, growth medium, and other liquids
- Collecting samples with zero risk of contamination assemblies
- Media filtration assemblies
- Inoculation assemblies

- Removal of liquids from bioprocess assemblies
- Carboy/bottle assemblies for cell culture
- Product Filtration assemblies
- Filter manifold assemblies
- Peristaltic pump tube manifold assemblies. ■

## Author



### Chandan Kumar Sah

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# Achieving Operational Excellence with Digital Twin

*Since the dawn of automation in the early eighties, process industry has focused solely on efficiency as the key to performance gains and technology integration. The last 5 years however and the pandemic in particular has changed industry expectations to move the focus to Digital Transformation to drive plant and human resources to deliver business performance. Amongst several Digital Transformation technologies being implemented today, Digital Twin has proven to be most impactful throughout the lifecycle of a facility providing benefits from design to plant start up and later operations. Many consider it a first step towards real Digital Transformation and a practical investment regardless of the size of the plant or enterprise.*

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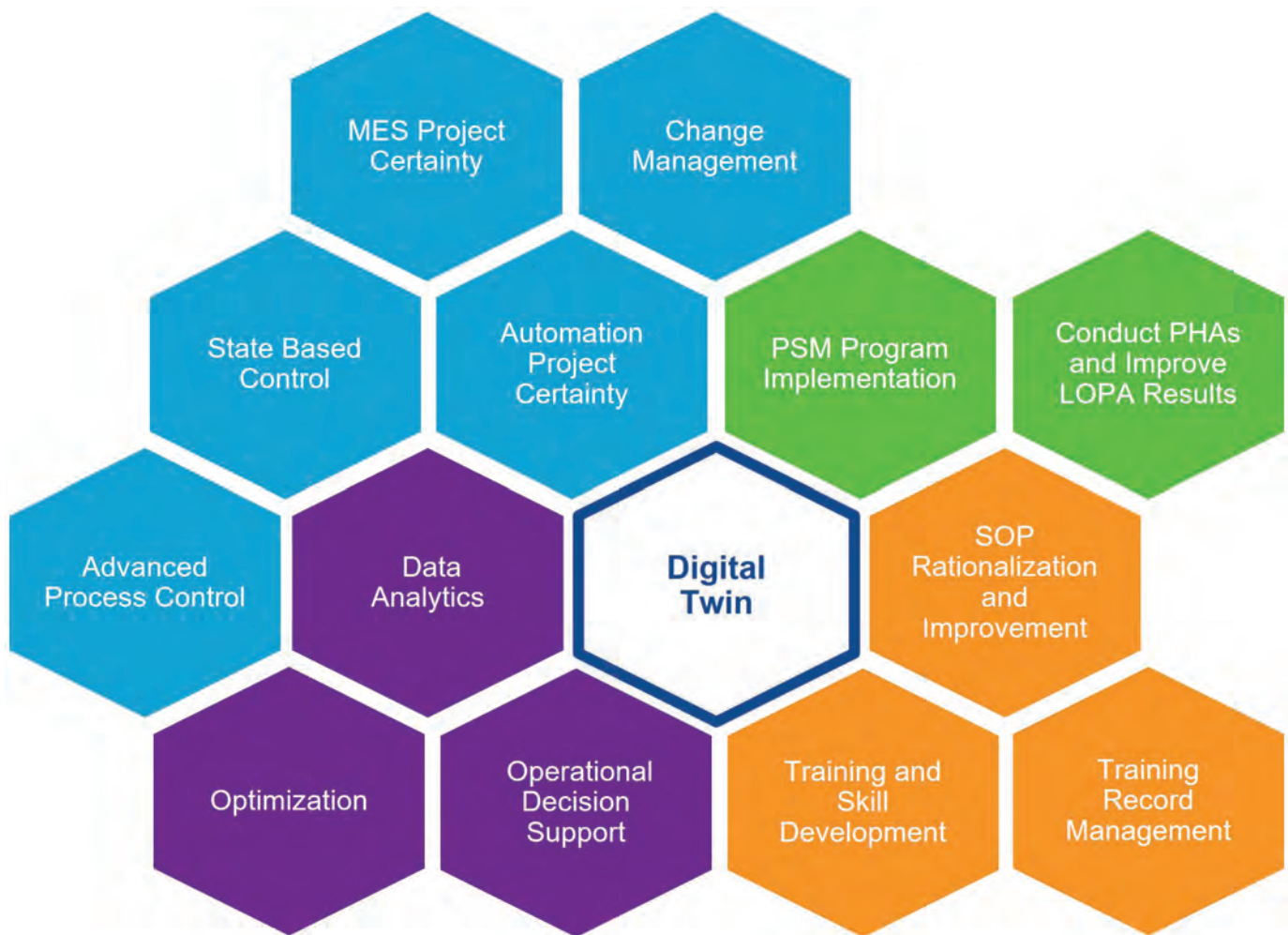
Digital Twin is a digital model or replica of a physical asset, process, system, facility, etc. It involves Steady State and/ or Dynamic Simulation of the

controls, physical assets, and process of the plant running in real-time in an offline environment. Prediction of actual emissions with fuel or raw material change is most desirable as plant operators face the difficult challenge of maintaining and improving productivity while staying within emission limits. Minimizing GHG emissions and helping organizations achieve

Sustainability and De-carbonization goals has become the newest KRA based on physics first principles rather than data driven in regular PEMS – Predictive Emissions Monitoring System.

## Using a Digital Twin in the Design Phase

Gives users more certainty they'll hit targets while securing safety when they start operations and thus meet business goals. First with modeling of individual assets and then the whole plant.



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Optimizing process models before design is finalized and evaluating projects with deeper level of process understanding will improve quality and reduce cost of

automation projects. It enables optimizing selections like equipment, pumps, pipe diameters, etc. One can then go into start-up with the confidence that the facility is ready to operate at optimal performance.

### Key Result Areas (KRAs) of Digital Twins

- Plant Efficiency
- Process Optimization
- Energy Management
- Emissions Monitoring
- Prediction of Emissions
- Sustainability & Decarbonization

Before commissioning, users can ensure safe startup by testing integrated controls, startup procedures and train operators in live environment. Our experience shows that a new facility can typically be started up with 25 – 30 percent time savings and reach full production much more quickly. Virtual commissioning avoids costly occupation of personnel at site while

issues of process design, engineering, automation, and quality are identified and resolved prior to actual commissioning. Equipment and safety issues resulting from starting up process are thus pre-empted and taken care of adding to overall huge savings in project costs, sometimes up to 40 percent.

**The most tangible benefits are observed in Operations phase-**

- Optimize plant performance,
- Improve decision making,
- Implement state-based control,
- Alarm management practice
- Train operators to maximize productivity.

Within the entire digital transformation journey, people are the center of it and digital twin are the ideal tool to help them adopting new technologies and evolve with it. Digital Twins thus can have a major impact on the reliability, availability

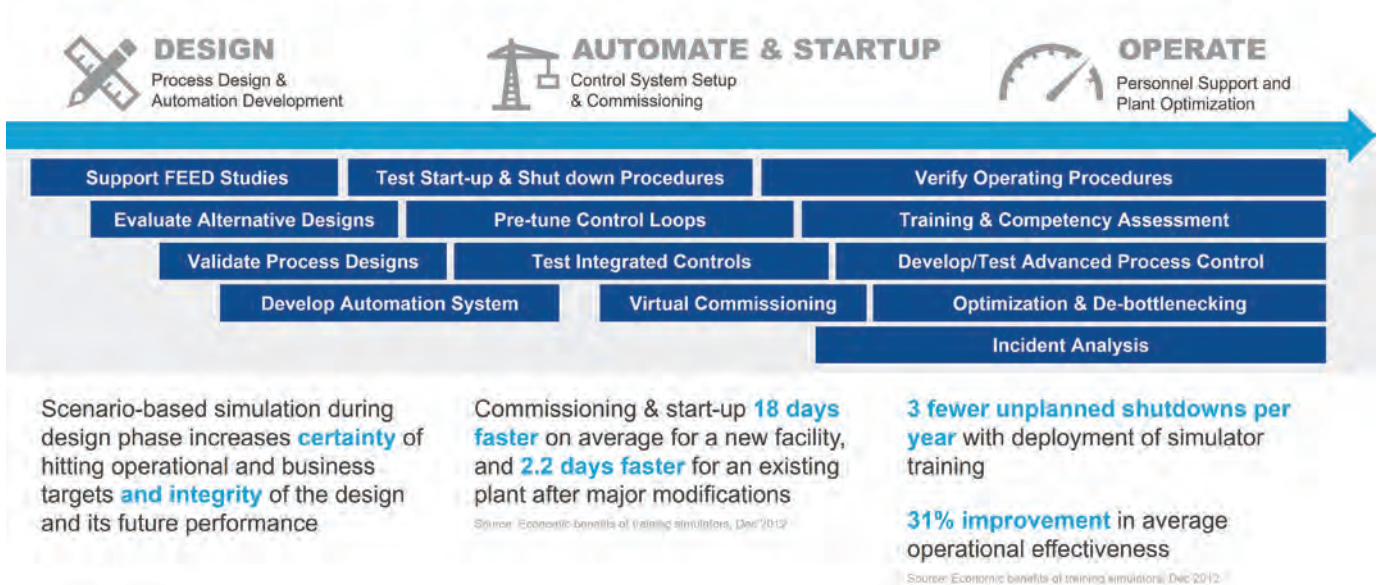
and throughput of the facility leading to Operational Excellence.

Intuitive user interfaces to enable users of all skill levels to use the solution and other methodologies for ease of use are not just for competitive advantages of a Digital Twin supplier but is most critical to keep focus on improving the process industry rather than learning software.

**The process models developed can be**

- **Steady state**
- **Dynamic** - solutions using first-principal models with the actual automation platform help better representation of relational interactions with actual plant process. They can further connect to the live data so the model mirrors ongoing reality
- **Real-time**

**Digital Twin Provides Benefits Across the Lifecycle of a Facility**



## Digital Twin for decreasing Utility costs

While Process Simulation is de facto application in industry for Digital Twin, energy intensive industries are seeing benefit in applying the technology for Utilities. Energy is one of the biggest operating costs in process, accounting for as much as 40 percent in industries like refining. Other chemical processes are not far behind, and industry estimates show that 30 – 40 percent of energy brought into plants is wasted. 15 percent or more of generated steam is lost. Among contributing factors, inadequate monitoring of furnaces and gas-fired heaters can cause excessive fuel consumption, increased emissions and added maintenance cost. Energy is also wasted as the result of leaks and process variability due to inadequate monitoring. Utilities Digital Twin is thus as necessary and important as Process. A comprehensive view of utility system will enable actions to minimize steam loss, optimize boiler loads, compressed air supply, electricity consumption and determine energy losses. Bad actors in process will be identified. Which boilers to use, compressors to run, fuel to switch to help in decision making on the fly as per plant dynamics and production demand.

## Beyond Process & Utilities and Design optimization

Operator training that is important for workforce upskilling and operational

performance, Digital Twin is critical to safe operations. It plays a key role in Process Safety Management Compliance with Hazard Identification and Risk Analysis (HIRA).

### Users can conduct-

- Process Hazard Analysis (PHA)
- Layers of Protection Analysis (LOPA)- to determine overall risk from data in a Hazard
- Risk Analysis (HAZOP)

Understand potential causes of incidents and consequences of safety failures be outlined through an approved method such as what-if analysis, a system must be established to address findings and recommendations. Depending on the industry, PHA must be conducted prior to startup of the operation and updated every 5 years. Thus, one can measure effectiveness of their own Process Safety Management (PSM) program.

Integrating Industry 4.0 technologies such as Data Analytics, Artificial Intelligence (AI), Machine Learning (ML), Virtual Reality (VR), etc. have augmented Digital Twin capabilities further.

## Digital Twin adds first principle-based knowledge to Analytics to help solve-

- Operational challenges through initial model training



- Address gaps in available data
- Reduce complexity of cross unit analysis
- Provide operational decision support with real-time optimization.
- Inferred measurements- with forward looking what-if scenarios help preempt and plan production schedules.

## Integrating VR in Digital Twin

Virtual Reality experience takes Digital Twin to a whole new level with integration of immersive 3D technology. Field Operator training with VR almost matches hands on experience so essential to building competence. It leverages existing 3D CAD models available, upscales graphics quality, add in field training

scenarios and deploys on your VR headset.

Validation of Standard Operating Procedures (SOP) multiple times is not possible in a running plant. Integrated training between control room and field operators through collaborative startup and shutdown aids aligns all departments to the common goal of production – operational excellence or emergency response.

## Digital Twin on Road map to Digital Transformation

Implementing a Digital Twin is the first step to on the road to Digital Transformation and top quartile operator performance. Industry specific applications such as validation to 21CFR

## Building the 3D Simulation

**Step 1** Load a 3D CAD Model



**Step 3** Add in field training scenarios



**Step 2** Upscale graphics quality



**Step 4** Deploy on your device



part11 compliance in Pharma industry, state-based control for specific processes to provide one knob operation, golden batch production is some of the numerous use cases that the technology can be extended to.

## Conclusion

Maximizing performance is not easy. There's little room for guesswork, so when it comes to knowing what will truly improve your operations, foresight and collaboration of cross functional teams is invaluable. A digital twin helps with expert collaboration of operations, regardless of the location, function, business unit and even stake holders outside the organization, thus providing a truly collaborative and fulfilling experience. ■

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# CHEMICAL ENGINEERING WORLD

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to  
Connect with Chemical  
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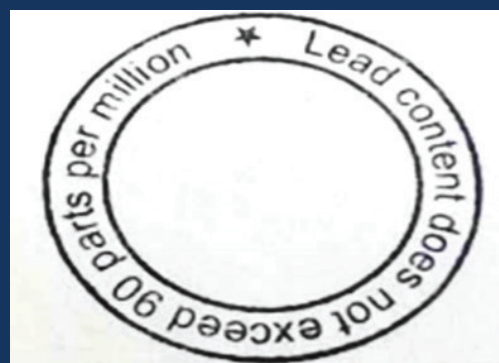
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## VOXCO Lead Free Pigments as a Replacement for Chromes

**D**ue to toxicity use of lead chromates has significantly declined in recent years. In India BIS (Bureau of Indian Standards) prescribed that maximum limit for lead in Decorative paint is 90 ppm or 0.009% on Solids (NVM) that means 3 gm of Lead is allowed in 100 Kg Decorative paint. However, due to the excellent price to performance ratio of lead chromate, the complete replacement has failed to occur so far.

In recent times, due to environmental concerns, lead chrome-based pigments are being replaced by similar shades of organic pigments. Though these organic pigments do offer different colours but do not have the required hiding power and equivalent properties of light and weather fastness due to which they are not comparable to the chromes. VOXCO



**“Lead content does not exceed 90 parts per million”**

To be stamped on paint container for Decorative Paint

Lead Free Pigments have drop in colour pallet to the chromes with good opacity and exterior durability as compared with organic pigments. These pigments can be used as replacement to inorganic chromes under special consideration.

## About Lead Pigments

Some of the Lead Chrome Pigments are Lemon Chrome Pigment (PY 34), Middle Chrome Pigment (PY 34) and Scarlet Chrome Pigment (PR 104)

Lead Pigments	
Advantages	Disadvantages
Excellent Opacity	Non Eco-friendly
Excellent Brightness	Takes longer time to disperse
Value for money	Settling observed due to high specific gravity
	Poor alkali fastness

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Lemon Chrome (PY 34)

Lead (Sulfo) Chromate

Middle Chrome (PY 34)

Lead Chromate

Scarlet Chrome (PR 104)

Lead (Sulfo) Molybdated Chromate

## Lead Pigments versus Lead Free Pigments

	Lead Pigments	Lead Free Pigments for Decorative	Hybrid Pigments for Industrial
Color	Standard	Comparable	Comparable
Color Strength	Standard	High	Low
Opacity	Opaque	Less opaque	Less opaque
Light Fastness	Good	Good	Very Good
Heat Fastness	Good	Good	Very Good
Solubility	Insoluble in solvents	Sparingly soluble in some solvents	Insoluble in solvents
Environmental Friendliness	Non Eco-Friendly	Eco-Friendly	Eco-Friendly

## Chemistry for replacing Lead Pigments

Lead Pigments	Lead free pigment for Decorative	Hybrid Pigments For Industrial solutions
Lemon Chrome	Monoazo/ Disazo PY 74, PY 65	Benzimidazone PY 151, PY 154, PY 184, MMO
Middle Chrome	Monoazo/ Disazo PY 74, PY 65, PY 83	Isoindolinone/ Isoindoline PY110, PY 139, PY 184, MMO
Scarlet Chrome	Naphthol/ Naphthol AS PO 5, PO 13, PO 34	Diketo-pyrrolo pyrrole PY 184, PY 254, MMO

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VOXCO Hybrid Pigments are used for Industrial Applications having following chemistries- **Benzimidazolone / Isoindoline / Isoindolinone / Diketo-pyrrolo-pyrrole** These are used as replacement for Lead Pigments in Industrial Applications.

Where Lead free pigments for decorative applications have following chemistries-

**Monoazo / Disazo / Naphthol** These are used for replacement of Lead Pigments for Decorative Applications.

### Hybrid Pigments for Industrial Application



Industrial structures like Heavy Machineries, Oil Rigs, Farm equipments, Earthmovers are always exposed to severe

## VOXCO Lead Free Pigments for Industrial Applications

**VO-HP-250LG**  
Replacement for Lemon  
Chrome

**Lead Chrome  
Replacement**

**VO-HP-350HG**  
Replacement for Middle  
Chrome

**VO-HP-750CA**  
Replacement for Scarlet  
Chrome

atmospheric conditions. So, pigments used for making coatings for such Industrial structures must have excellent light and weather fastness. VOXCO has Hybrid pigments for Industrial application which are blends of High Performance Pigments having excellent light and weather fastness.

### Characteristics of VOXCO Lead Free / Hybrid Pigments\*

- Closest match against Lead pigments
- Can be used for Decorative & Industrial applications
- Can be used in Water based paints, Universal colorants
- Heavy metal free
- Environment Friendly. ■

*\*The information included here is based on the reliable data generated by our R&D team. Since the performance of pigment also depends on the resins and additives used, prospective users should test these pigments in their resin system.*



**Author**

**Minal Mayekar**

Technical Product Manager  
VOXCO Pigments and Chemicals Pvt Ltd

## Alleima to invest in new heat exchanger tubing facility in Mehsana, India



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**L**ast year Alleima, former Sandvik Materials Technology, a global manufacturer of advanced stainless steels, special alloys, and heating systems, announced the investment and expansion of its Mehsana manufacturing facility, in India. As part of the formerly announcement, today the third phase of the expansion will start, which include the set-up of a new heat exchanger tube factory. The new factory will meet burgeoning demand of locally

manufactured products in India.

“The Mehsana Mill is an important facility in our journey towards increasing our footprint in Asia. As part of our strategy to invest capacity and capability in growth markets we last year announced the investment of a brand new hydraulic and instrumentation tubing factory, as well as the extensively revamped finishing facilities for the heat exchanger flow. These facilities are in advanced stages

of completion. To further strengthen our growth in India we now start the third phase of that growth initiative, where we will set up a new heat exchanger tube factory. This will double our capacity of heat exchanger tubes in India and enable us to capture growth opportunities coming from the increased petrochemical growth in India over the next decade," says Michael Andersson, president of Tube division, Alleima.

The Mehsana manufacturing facility has been successively expanded and modernized in recent years to increase availability of high quality seamless stainless steel and high alloy tubes as well as to strengthen service in the region.

**The first phase:** Completed in 2020 when Alleima added a new cold finishing tube manufacturing line mainly for heat exchanger tubing and other demanding industrial applications.

**The second phase:** Next phase of the investment was setting up a bright annealed and finishing line for heat exchanger, along with hydraulic and instrumentation tube factory which will help to cater to the growth in the natural gas segment.

**The third phase:** The investment during this phase would ensure towards the set-up of a new heat exchanger tube factory which will be fully completed and

operational by Q3 2023.

The projected global growth for the chemical and petrochemical market is expected to be around 4 percent CAGR between 2021-2026. India is expected to be accounting for a significant portion of this growth. This will translate to significant growth opportunity in heat exchanger tubes.

"For the past few years, we have been focusing on boosting capacity, adding new products, and constantly improving to meet the highest global quality standards as well as customer specifications. This investment further strengthens our heat exchanger tube capacity and will enable a significant transformation in our portfolio towards special alloys and enabling us to capture growth in the chemical and petrochemical customer segment in India. We look forward to ramping up on our production to cater to the increasing demand for locally manufactured products in India, while aligning with the Government of India's "Make in India" and "Atmanirbhar Bharat" or "Self-Reliant" program. We also look forward to enabling further export and swifter delivery times to customers across the region," says Sharath Satish, president, business unit Tube APAC, Alleima.

## About Alleima

Alleima, formerly Sandvik Materials



Technology, is a global manufacturer of high value-added products in advanced stainless steels and special alloys as well as solutions for industrial heating. Based on long-term customer partnerships and leading materials technology, we develop products for the most demanding applications and industries. Our offering includes products like seamless steel tubes for the energy, chemical and aerospace industry, precision strip steel for white goods compressor, air conditioners and knife applications, based on more than 900 active alloy recipes. It also includes ultra-fine wires for medical and micro-electronic devices, industrial electric heating technology and coated strip steel for fuel cell technology for cars, trucks, and hydrogen production. Our fully integrated value chain, from R&D to end-product, ensures industry-leading technology, quality, sustainability, and circularity. Alleima, with headquarter in Sandviken, Sweden and revenues of SEK 13.8 billion in 2021, has more than 5,500 employees and customers in approximately 90 countries. Alleima was listed on Nasdaq Stockholm on August 31, 2022 under the ticker 'ALLEI'. Learn more at [www.alleima.com](http://www.alleima.com)

## About the Mehsana Mill

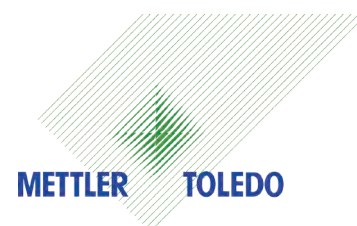
Alleima Mehsana is a high-tech tube mill situated in Gujarat, western India, that produces advanced corrosion resistant tube, pipe and hollows for heat exchangers

and process equipment across a wide range of industries. Grades range from austenitic stainless steel to duplexes and austenitic high nickel alloys. The mill has an advanced modern laboratory to test metals and particular tests are undertaken to measure the tensile strength, yield strength, test for flattening, flaring, grain size, micro characterization, and many others. Standards fulfilled include ASTM, ASME, EN, NACE 0101/0175 and other customers specifications. ■

### For more information

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# Accurate Preparation of Standard



**I**n analytical R&D or QA/QC laboratories, accurate standard preparation is crucial for the quality of the analytical results, which in turn has an enormous effect on laboratory efficiency. Analytical R&D laboratories are responsible for development, optimization, and validation of various methods used to analyze their products. Chromatographic techniques like HPLC or GC are commonly applied in analytical R&D and QC labs for identifying, quantifying and purifying the individual components of the mixture. The purity, concentration and composition of these components has a major influence on the quality of the final product, its efficiency, safety, shelf-life, and many other important product features.

## For Chromatographic Analysis

To run a chromatographic analysis, many identical samples must be prepared and run through the whole analytical method to see whether the necessary details can be determined. HPLC and GC methods employ the use of known reference substances as standards, to gain traceable results from the evaluation.



Therefore, reference standard preparation is a common daily task in most analytical laboratories.

## Importance of Standard Preparation

The quality of each analysis largely depends on the quality of the sample and standard preparation, and this in turn on the quality of the dispensing and weighing processes. Any error in this early stage will be propagated downstream in the analysis. Errors caused by deviations from specification – known as out-of-tolerance (OOT) or out-of-specification (OOS) errors - and the resulting rework time and costs should be avoided. OOS investigations are costly and time consuming. Sample

preparation is reportedly the most time-consuming, labor-intensive and error-prone part of the workflow, with some 50% of OOS errors attributed to either sample processing steps or human error. Many of these errors can be eliminated by using automation, which reduces the variability in sample preparation. As sample preparation can take up to 60% of the time in an analytical laboratory, the weighing technology needs to deliver accurate and reliable results very quickly.

### **Solution: XPR Automatic Balance with LabX™**

Software that METTLER TOLEDO has developed- the XPR Automatic Balance, with both automated and manual weighing and dispensing options, which sets the new standard for weighing and dispensing in the laboratory. It offers intelligent functions, such as automated calculation of amount of solvent required to achieve desired concentration, to support accurate sample and standard solution preparation in an automated way. XPR Automatic Balance connected to LabX software enables standard solution preparation with automatic data processing. Metadata are automatically captured and saved in a centralized database. You can start your digital dosing task with just one click, directly on your balance terminal. LabX guides you step-by-step through your SOP with clear on-screen instructions. All calculations are performed automatically, and transcription errors are eliminated.

LabX integrates fully with chromatography software and sends your weighing results directly to where the weight values are required for subsequent chromatographic analyses. In this way, LabX offers a seamless data flow during the entire analysis workflow, guarantees a high degree of process security, and supports you also with the fulfilment of the FDA ALCOA+ requirements for data integrity.

### **About METTLER TOLEDO**

METTLER TOLEDO is a leading global manufacturer of precision instruments. The Company is the world's largest manufacturer and marketer of weighing instruments for use in laboratory, industrial and food retailing applications. The Company also holds top-three market positions for several related analytical instruments and is a leading provider of automated chemistry systems used in drug and chemical compound discovery and development. In addition, the Company is the world's largest manufacturer and marketer of metal detection systems used in production and packaging. Additional information about METTLER TOLEDO is available at [www.mt.com](http://www.mt.com). ■

#### **For more information**

[www.mt.com/IND256x](http://www.mt.com/IND256x)  
Toll Free -1800 22 8884 / 1800 10 28460  
Email: [sales.sales@mt.com](mailto:sales.sales@mt.com)

## Building the Plants of Future

**Chemtech**  
FOUNDATION  
Inspiring Intelligence > Igniting Innovation

**AVEVA**



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**A**s industries accelerate digital transformation initiatives, focus remains on driving efficiency to stay profitable and competitive amidst complex challenges and eroded margins. Besides, energy transition continues to accelerate as the world responds to climate change challenges. The need for efficient, data-driven, and green facilities is growing, increasing the pressure on the industries to transform how they engineer, build, and operate new and existing plants. Taking cognizance of needs of Owner Operators & EPCs to build clear strategies Chemtech Foundation and AVEVA organised Executive Roundtable discussion “Building the Plants of Future - Balancing sustainability, Digital

transformation & Efficiency to Achieve Carbon Neutrality”.

The challenges of engineering the plant of the future are relatively undisputed, and the opportunity for improvement is just as clear. Digital transformation provides an opportunity to gain safety, efficiency, and significant financial benefits, including a five to ten percent reduction in build costs and a whopping ten to twenty percent reduction in operational costs. The content focused on increasing engineering efficiency and operational agility by connecting data, people, and processes.

Participants in the roundtable explored why a market that is more open to change than ever before is looking to drive



"When we as AVEVA look into R & D expenditures we are now looking at how the investments we make in R & D will

have an impact on sustainability objective of our customers. It's an interesting paradigm shift for us; now we have realized monetization on digital technologies is equals driving towards sustainability."

**Mr. Emon Zaman**

Sr. Vice President - APAC  
AVEVA



"If you look at the recent events happening, they will direct you to focus towards on one thing- Sustainability. So, our future projects would

have sustainable idea implemented right from the start for a Net Zero carbon emission future. This will require a simultaneous approach, at one we should start eliminating them, on the other side while we use them, we should develop technologies to extract more and more energy out of them and generate less waste."

**Mr. Suresh Nambiar**

Chief General Manager (Strategic IS)  
IndianOil



"Because of climate change, sustainability has come into foray. While earlier we had only transactional risk associated with projects,

per se technological risk resulting from disruptive technologies coming up but now we have to also include physical risks resulting from climate change into our decision-making process, increasing the complexity of developing future plants."

**Mr. DK Sharma**

ED Strategy & Planning  
HPCL

resilience and embracing the plant of the future, how future plants will operate, the key factors the industry must consider and strategies to achieve the end goal of sustainable, efficient, modern plants and ships that are fit for purpose in the future. Prabhjit Didyala, Managing Director, Accenture moderated the discussion with D K Sharma, ED Strategy & Planning, HPCL; Alok Sinha, Head- Project Management Group, Reliance Industries Ltd; Rajesh Samarth, Managing Director, Lummus Technology; Suresh Nambiar, CGM – Strategic Information Systems, IndianOil; Brijesh Trivedi, Engineering Division Head L&T-Chiyoda Ltd; Mithu Saha, DGM – Energy Transition, Worley and Emon Zaman, Sr. Vice President (APAC), AVEVA.

Data-driven culture connects workers and information in the cloud, EPCs and Owner Operators gain detailed, end-to-end insights required to quickly identify opportunities to become leaner and greener. Navanith Mohan, Head Technical Sales, AVEVA walked the attendees through how Industrial Metaverse enables to engineer the plants. Emon Zaman shared insights into engineering new projects & transform existing plants to create sustainable, digital & future proof facilities. In his talk 'Digitally Uncover Profitable pathways to NetZero', Naveen Kumar, Vice President Sales, Global P&O, AVEVA shared in depth insights.

More than 70 invitees from E&P, Refining & EPC industries attended the event on Friday, 8th October 2022 in Mumbai. ■

## ITALVACUUM

### Improving drying processes since 1939

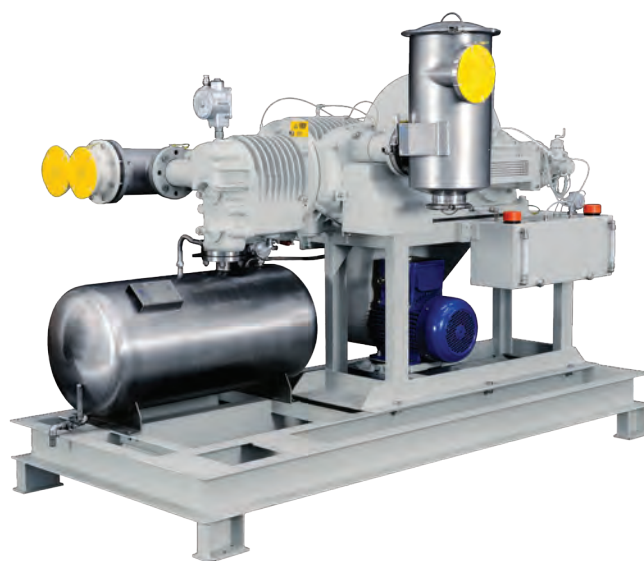


Italvacuum is one of the leading international manufacturers of vacuum pumps and vacuum dryers since 1939 mainly used in production processes in chemical, fine chemical and pharmaceutical companies. Striving to serve its customer's needs all around the world, the firm offers multiple versatile turn-key solutions, as well as tailor-made equipment and systems, according to the client's individual process requirements in the chemical, specialty chemical, agro-chemical fine-chemical and pharmaceutical industry. Moreover, their original and patented product selection complies with all the general international regulations (ATEX, UL, PED and ASME) and with the latest FDA and cGMP norms.

#### Saurus939® - Italvacuum's trademark

The vacuum piston pump that guarantees best performances, ensuring total recovery of extracted solvents, even in severe operating conditions. A simply designed machine, that combines traditional robustness and reliability with the most evolved technology.

Resistance, strength and consumption of oil virtually eliminated thanks to the



innovative LubriZero® system. A solution which guarantees perfect operation and optimum results with total respect for the environment. Saurus939® has no fear of aggressive and corrosive solvents, powders and condensates, nor distillation by-products.

But above all it does not fear confrontation because it is designed and manufactured to work 24 hours a day with a constant excellent performance and minimum operating costs, thanks to a low-energy motor, negligible oil consumption and easy, immediate maintenance.

Powerful, efficient, but absolutely safe: Saurus939® guarantees optimum safety through the whole process and complete



Some moments of the last training held in September in Italtvacuum facilities that had technical - operational parts and technical - documentary parts

purity of the final product.

In other words, ensures an uncontaminated vacuum. Saurus939® has a wide range of use and could be employed in different sectors: Chemicals, Pharmaceuticals, Cosmetics, Oil & Gas, Plastics & Rubber, Bioscience and Waste Management. Especially effective in the processes of drying, reaction, distillation, crystallization, filtration, evaporation and polymerization.

### **Tradition, Innovation and technical support**

Since 1939 Italtvacuum produces vacuum

pumps with great technical know-how and a thorough knowledge of the needs of its customers, which has also progressed along with the developments in chemical and pharmaceutical industries. The company's awareness on those changes over time, enabled its engineering services to build up unparalleled expertise in vacuum processes.

Focusing on individual needs, pilot tests can be arranged at the manufacturer's headquarters to determine the best possible solution for the clients.

Since efficiency and safety are of highest

priority, Italtvacuum's qualified personnel provides the following services after an installation

- Scheduled Preventive Maintenance
- Technical Assistance
- Service Parts
- System Upgrading and Overhaul.

In giving assistance in all of these areas, the firm ensures the proper function as well as durability of the product and a fruitful production process.

### Not only Saurus939®: the dryer series

**Multispray Cabinet Dryer®**, tray vacuum dryer with C.I.P. (Clean in Place) Multispray® patented fast-washing system.

**Criox® System**, rotocone vacuum dryer / powderer with electric lump-breaking units.

**LaboDry®**, laboratory-scale tray vacuum dryer.

**Planex® System**, patented horizontal vacuum dryer with ZeroFriction® planetary movement eccentric agitator.

**CosmoDry® System**, patented horizontal vacuum dryer with concentric agitator

### Italtvacuum presence in India - 20 years of cooperation

Over a thousand vacuum pumps from Italtvacuum has been installed in India in just 20 years. This fantastic result has been possible thanks also to the cooperation with Vacuum Drying Technology India LLP, based in Mumbai,

sole agent for Italtvacuum in India, since many years.

The goal is to always provide the best support to our customers, in India as well as anywhere else in the world, with the support of our long-time partners. Vacuum drying technology can provide local technical assistance, Local after sales support and presence for every need; spare part management; Engineering and Commissioning.

Italtvacuum provide constant training provided by to all the salesmen and technicians, Vacuum Drying Technology technicians receive regular courses at Italtvacuum headquarters.

### Visit us in P-mec Exhibition!

**Booth 15A.C74 | India Expo Centre, Greater Noida, Delhi NCR | 29 November - 01 December**

Italtvacuum and Vacuum drying technology team will be glad to introduce you the company, the vacuum dryers and pumps range and will exhibit a mock up of its vacuum pump model VVB double stage. ■

#### Contact Details

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Website: [www.italvacuum.com](http://www.italvacuum.com)



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to  
Connect with Chemical Industry Ecosystem  
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## BASF introduces CircleStar™, an innovative dehydration catalyst to process renewable feedstocks



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The novel star-shaped catalyst achieves a 99.5% selectivity for the ethanol-to-ethylene (E2E) conversion. With an operating temperature that is more than 25°C lower compared to conventional processes, CircleStar™ helps to decrease the carbon footprint in the bio-ethylene value chain for products ranging from jet fuel to plastics by more than 10 percent while keeping the same performance.

The advanced performance of this innovative catalyst is due to its unique star shape that maximizes the active geometrical surface area for the reaction. In addition, the packed density in the reactor bed is significantly lower compared to conventionally shaped catalysts, which impacts the overall cost optimization of the reaction.

<https://www.catalysts.basf.com/>

## New Additives to support Sustainable evolution of Plastics launched by Clariant



Clariant's novel additives would promote sustainable plastics increasing reuse of plastics by recycling causing lesser need to raw material resources.

Licowax® AS 100 TP- Moulded plastics are used across a widely across many consumer industry's end-users. This new additive when used formulations having Polypropylene (PP) and Thermoplastic olefins (TPO) formulations induces anti-scratch properties in end products which enables them to maintain their aesthetics.

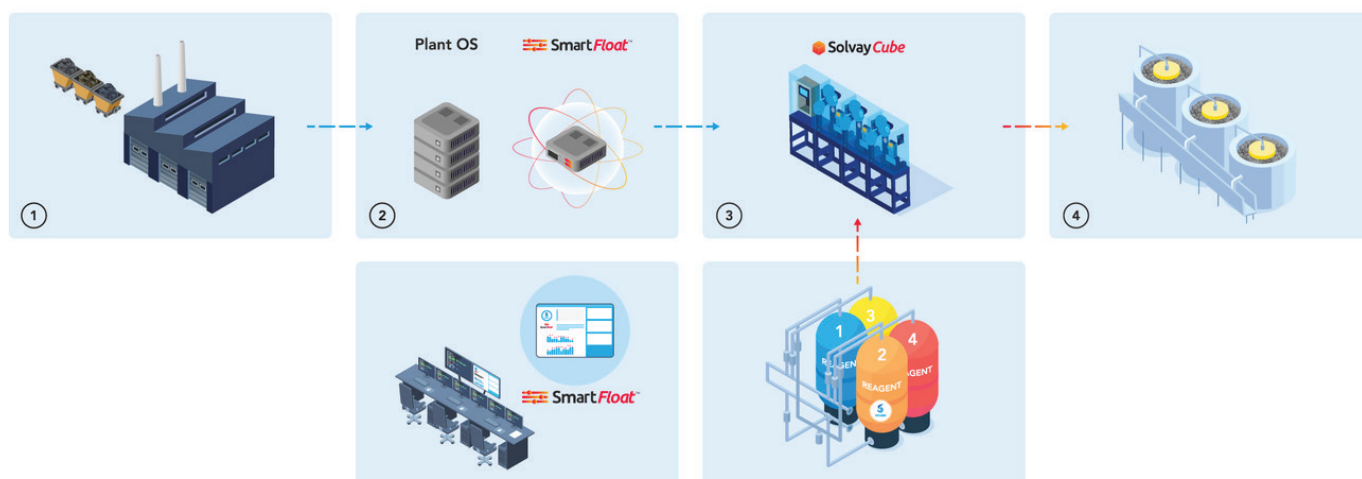
Licocare RBW 560 TP Vita can withstand higher processing temperatures owing to

better thermal stability and low volatility while working effectively at low dosages as well. In addition, it also has better colour stability making it attractive to formulators of polyester compounds for use in transportation and E&E industries. The new additive promotes easier mold release which improves the surface quality.

Productivity-wise, it also means fewer polyester parts get stuck in the mould, thus reducing downtime & maintenance.

<https://polymer-additives.specialchem.com/selectors/tr-licowax>.

## Solvay Introduces SmartFloat- A digital mining solution



SmartFloat, A first of its kind AI enabled digital system that improves floatation of base metal which improves operational efficiency, metallurgical results and also improves sustainability aspects. SmartFloat also has integrated innovations to help mining operators to automate tasks, streamline decision-making and optimize recovery.

Utilizing proprietary Flotation Matrix 100TM methodology, SmartFloat uses real time data to recommend best suitable

reagent formulation along with dosage information based on the obtained latest real time data in a short time. This can enable miners to respond faster in depending upon the ore composition data collected by the system, resulting in reduced wastage of reagents, energy et cetera.

<https://www.solvay.com/en/brands/smartfloat> ■

Dynamic Platform  
to  
Connect with Chemical Industry Ecosystem  
Direct Reach  
to  
**>200,000 Readers**  
across  
**>25 countries**



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